SCIENCE AS SOCIAL ACTIVISM

kerala
sastra sahitya parishad
1984

CCMH 354
212

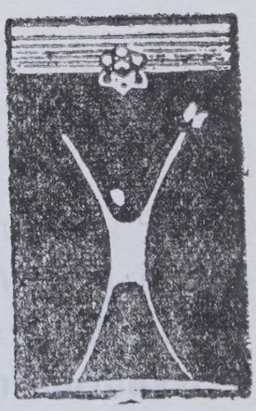
medico friend circle
[organization & bulletin office]
326, V Main, Ist Block
Koramangala, Bangalore-560 034

COMMUNITY HEALTH CELL
47/1 St. Mark's Road, Bangalore - 560 0

SCIENCE AS SOCIAL ACTIVISM

Science as Social Activism

Reports and papers on The People's Science Movements in India



Kerala Sastra Sahithya Parishad
1984

SCIENCE AS SOCIAL ACTIVISM

Reports and Papers on the People's Science Movements in India

Papers and Proceedings of the Second All India Convention of People's Science Movements held in Trivandrum, India during February 9, 10 and 11, 1983

Published by: Kerala Sastra Sahithya Parishad
Parishad Bhavan, Trivandrum-695 001, Kerala, India.
First edition: February, 1984
Printed at: Social Scientist Press, Trivandrum
Copyright: Kerala Sastra Sahithya Parishad (KSSP)
Price: Rs: 50.00. Dollars 10 (outside India)

212 HM-100

The Publishers acknowledge their gratitude to the Department of Science and Technology, Government of India and to the Indian Council of Social Science Research for their assistance in bringing out this publication.

COMMUNITY HEALTH CELL
~~477. (First Floor)~~ ~~Sri Marks Road,~~
Bangalore - 560 001. 68

LIBRARY AND DOCUMENTATION UNIT BANGALORE

KSSP welcomes comments and remarks from readers. Kindly write to

Kerala Sastra Sahithya Parishad, Parishad Bhavan
Trivandrum-695 001, Kerala, India

KSSP 0280/84 PSM (Eng) 2 D/8 1/1000

CONTENTS

Page

Introduction: PSM in the Indian Context — vii

I

THE KERALA SASTRA SAHITHYA PARISHAD

Kerala Sastra Sahithya Parishad—A People's Science Movement? — 3

Fusing Science and Art for the People — 26

Sastra Kala Jatha unmasks Perpetrators of Evil — 30

II

CONVENTION OF PEOPLE'S SCIENCE MOVEMENTS, 1983

Twenty years of KSSP — 35

Science and Development
M G K Menon — 40

Social Scientists and Social Revolution
K N Raj — 46

Towards A People's Science Movement: A Report — 54

III

REPORTS FROM PSM GROUPS

Role of PSM in People's Movement: A view from Lok Vignyan Sanghatana (Maharashtra) — 71

Peoples' Science Movement: A West Bengal Perspective — 80

Medico Friend Circle — 83

Patriotic and People Oriented Science and Technology (PPST) Group — 87

People's Science Movement in Andhra Pradesh — 92

People Planning and Science in School: A Report from Vidushak Karkhana — 95

Page

Manan Nava Chinta Andolan and Bharatiya Samyabadi Sangha (West Bengal) — 104

Audyogic Jeevan Manch — 107

IV
BACKGROUND PAPERS OF PSM CONVENTION, 1983

Practicing Politics and Science
Norman Diamond — 111

Environment and Development in India
K P Kannan and Ashoka Mody — 116

Environment and Development: KSSP's Approach
M K Prasad — 123

Reform of the General Education System: A Tentative Proposal
M P Parameswaran — 129

Towards A People's Health Movement
B Ekbal — 140

V
SELECTED PAPERS OF THE PSM CONVENTION, 1978

People's Science Movements — 147

Reflections on "Science for Social Revolution"
Md Anisur Rahman — 153

ASTRA — 163

Bhoomi Sena Movement (Maharashtra) — 175

Centre of Science for Villages — 177

Gram Vikas Mandal (Belgaum) — 181

Ripples and Repercussions — 190

Scientific Worker's Forum (West Bengal) — 203

Science Education Group (Bombay) — 205

Shramik Sanghatana, Dhulia (Maharashtra) — 210

Society of Young Scientists (New Delhi) — 214

The Sokhodeora Community Health Programme — 218

An Introduction to "Vikshan" (Calcutta) — 224

Vigyan Shiksha Kendra (Atarra, U P) — 227

List of Participants — 229

INTRODUCTION:
PSM IN THE INDIAN CONTEXT

The genesis of the concept of a People's Science Movement (PSM) in the Indian context is a very recent one. Science-based education groups and their activities have been numerous in the country and one of the major areas of focus of these groups was the popularisation of science through the medium of the mother tongue. Some of those who pioneered in this effort and made significant contributions were persons who were themselves eminent as scientists.

However, the impetus and inspiration for science-based social activism came not from a mere desire for dissemination of information on natural sciences but largely from the disillusionment of concerned intellectuals, mostly in the younger age-group, with the official thinking and action in alleviating mass poverty and unemployment and its concomitant degradation of the human condition. During the 'sixties this disillusionment found expression in several groups of educated youth and intellectuals opting for voluntary work in the spheres of non-formal education, health and rural development. Some of them did try to understand and raise questions on the social and economic structure of the Indian society and attempted to grapple with the issues relating to political economy of development. At the political level, the debate on the nature of the Indian ruling class and the startegy for a revolution in the Indian society became much more intense. However, the pursuit for ideological purity more often resulted not in the strengthening of the progressive and democratic forces in the country but in its fragmentation and dissipation. As social and economic problems accumulated, the 'seventies witnessed a much more intensified turbulance in the political process of the country.

One of the positive aspects of the experience of the last two decades was the realization that any attempt at fundamental change in the Indian society would need the active involvement and participation of the poorer and voiceless majority. This perception about participation and the need for identifying issues in terms of the experience of the people gave an activist

orientation to the varied and often enlarging voluntary work in the area of development.

Groups engaged in science education and dissemination became conscious of the new challenges. From acquiring and disseminating knowledge to applying it with a view to change society meant the realization of a more active role for the intellectual community than was understood hitherto. It is in this context that one should examine the use of the medium and idiom of science for social activism.

One of the earliest groups to use the word science in the activist sense was the Kerala Sastra Sahitya Parishat (KSSP). A fairly long period of interaction with the people brought to its work the need for using science in the broadest possible sense embracing all branches of human knowledge thereby stressing the essential unity in nature. This understanding also brought to the fore the artificial and partial nature of the compartmentalisation of human knowledge into several branches without consciously trying to understand the essential unity and complimentarity in them. As experience showed, there was a natural science content for every social issue and a social science content for every issue in 'science and technology'. Imbibing and inculcating the method of science to understand not only the physical reality but the social reality as well and attempting to find solutions to social problems is what gives science an activist role.

In trying to project deliberately the role of science in such a framework the attempt is also to demystify the notion that science and scientists have an autonomous realm of existence making their intellectual pursuit unhampered by the mundane and murky social issues and problems. It is to underline and emphasize the relationship between science and society in shaping the lives of the people that the slogan 'Science for Social Revolution' was launched by the KSSP. While this slogan has a mobilizational appeal and should serve as a reminder at every stage of activity, it is not intended to mean that the practice of science will by itself ensure a social revolution.

On the contrary, it is the understanding of the KSSP, that there are a variety of forces in the society which work for social revolution. While these forces have their mobilizational and organisational strategies and ideological frameworks, there

exists a space for all those who believe in the power of science and practice it to fill the widening gap between the 'haves' and 'have nots': those with knowledge and those without. In the immediate Indian context, equipping the poorer masses with the power of knowledge of the social and natural forces governing their lives is as important, and basic as the attempt to improve their lot through redistribution of material wealth and income. In fact the two cannot be separated; one compliments the other.

Translated in operational terms, a People's Science Movement has to fight two trends in the Indian society. The feudal structure not only in the social and economic spheres but also in the cultural sphere needs to be effectively countered. Fighting against superstition, myths, obscurantism, communalism, fatalism, etc. has to be contained with greater vigour because all these forces are so deeply entrenched that mere economic change alone may not be able to erase them. At the same time, a mere rejection of these forces without understanding the socio-economic compulsions of depending on these feudal structures and values will not do. How can science impart a new direction and a new sense of purpose in this fight?

An equally dangerous but less talked about sphere in which another struggle has to be waged is the total acceptance of the so called modernization thesis. 'Development' is the term coined for this purpose. The power of this new faith to bring about misery to the poor is as strong as, and sometimes even greater than, the feudal forces. Creating modern physical structures have often been equated with development. Increased production is the sole objective here. Who benefits by this increased production, how is it distributed, at what and whose costs are these undertaken, whose power is enhanced are questions often underplayed and then ignored in practice for the sake of increasing the total pie. Several examples of the misery brought about by this can be cited. In recent years, exposing this dimension of the so–called development process has been due to the work of many voluntary groups. As an illustration, one has only to look through the pages of *The State of India's Environment 1982**, produced through the coordinated

* Centre for Science and Environment, *The State of India's Environment 1982: A Citizens' Report*, New Delhi, 1982.

efforts of several voluntary groups. That not only redistributive issues have suffered but even the explicit objective of increasing production has been only very tardily attained has come as an eye-opener to both official and non-official protagonists of this approach.

Caught in this dilemma and having to steer and alternative course for progressive social transformation is the major challenge facing the PSM in the Indian context. In trying to chalk out a new course it has to combine the best elements in one's tradition and the accumulated fund of human knowledge the world over. What is to be rejected is neither 'tradition' nor 'modernity' but all those elements which stand in the way of human progress towards a more civilised form of social life. Such a transition will not be complete without the participation of the people. If such a participatory process has to be initiated the absence of the scientific method and the widening gap in human knowledge has to be narrowed down. It is in this process that the PSM see its role. The dynamics of this process is such that 'learning' leads to 'action' which in turn leads to furthering and enriching the process of understanding. The ways and through which entry points this process has to be initiated will be largely dictated by one's immediate social environment.

While initiatives were taken by different groups at different regions, mostly at the micro level, an opportunity for bringing them together in a common forum under the banner of PSM was created only in 1978. Between the first convention of PSM held in 1978 and the second in 1983, five years have elapsed and it would be interesting to ask ourselves whether the second one was a progression from the first. The answer would be both yes and no. Yes because during this five year period there has been an intensification of the interest in initiating a PSM in several parts of the country. The awareness on the concept of a PSM has also been spreading. This has resulted in a number of fresh initiatives, both by existing and new groups. Many of the groups have been in contact with each other. A concerted effort was made in Maharashtra where a number of small groups have come together under a common forum called the Lok Vignyan Sanghatana. Though not calling themselves a PSM group and perhaps not well known, there were other serious and committed

groups like the Uttarakhand Sangarsh Vahini (in Uttar Pradesh) whose activities correspond broadly to the content of a PSM. In a sense, one may speak of the creation of a 'space' for PSM activity in India. This space is likely to enlarge and the growing interest of a large number of younger generation of intellectuals bear witness to this trend. It is in this sense that one may be tempted to view the period as one of progression.

In terms of organisational efforts at creating a network of PSM groups in India, there isn't much that one can claim. Some of the groups which attended the first Convention did certainly enlarge their range and depth of activities while some others remained where they were and yet some others either ceased to function or had to considerably reduce their level of activity for several reasons. Moreover, the groups were at different stages of evolution and this certainly came in the way of thinking about a co-ordinated network throughout the country. Therefore the current Indian situation viz-a-viz a PSM is one of a large number of disparate groups. Sifting them to identify a pattern one may find that there are:

(a) Groups of concerned educated persons, often of the younger generation, who undertake certain amount of activity at the local level. They may not necessarily be able to ensure the participation of people in the region. It is more of a process of 'learning' and and 'delearning' for those involved.

(b) Groups of concerned educated youth, often from the region where they work, and who along with the local people are engaged in activities which have a direct bearing on the immediate socio-economic and cultural context.

(c) Groups that are mainly urban-based, around centres of learning and research, and engaged in debating the various facets of science and society arising out of their concern for the contemporary Indian situation.

(d) Groups that have been able to spread their activities to encompass a cross section of the people in the State as a whole and, through a variety of methods and responses to problems, beginning to acquire the character of a movement.

Such a categorisation of the groups partly explains the difficulties involved in the creation of any kind of a national network in the organisational sense. But then the question is: Is there any inherent virtue in having an organisational network? Both the 1978 and 1983 Conventions felt that there is no particular virtue. In fact, some of them expressed caution in hurriedly putting together some kind of organisational network. This fear and suspicion of formal organisations emanates, it seems, from the experience that formal structures often retard flowering of new ideas and initiatives and might get bogged down in matters of detail as well as of organisational control. The overriding concern of a large number of groups was to keep the channels of communication and contact alive and vibrant so that a natural process of consensus on objectives and a broader philosophical perspective develops. This is as it should be and the time for any coordinated attempt is when the reasons for it are compelling for the progression of the PSM in the country. What is important at the moment is to sensitise an increasing number of groups and individuals by keeping the debate going.

It is with this objective in mind that the present volume has been planned. A word of explanation on the content of this volume is necessary here. Reports received from various PSM groups in the country have been put together along with detailed accounts of the evolution of the outlook and activities of the KSSP. Speeches made on the occasion of the 1983 Convention as well as papers prepared for discussion there have also been included. A separate section giving reports on the participate groups in the 1978 Convention along with a summary of the proceedings and the basic theme paper have also been included: the volume containing these papers have been out of print for some time now but the demand for it has been continuing as to justify the inclusion of the important selections for that volume.

If this volume helps in stimulating some serious thinking and interest in initiating PSM activities in this country it would have amply justified its publication.

EDITORS

I

THE KERALA SASTRA SAHITYA PARISHAT

KERALA SASTRA SAHITYA PARISHAT: A PEOPLE'S SCIENCE MOVEMENT?

INTRODUCTION

The KSSP is a 'Science Movement' in Kerala. Sometimes we refer to it as 'People's Science Movement' which is perhaps too presumtuous on our part. As an idea it is 25 years old, as a body of persons it is 20 years old, as an organisation it is 15 years old and as a movement it is 10 years old. Today it has a few hundred active cadres, a few thousand formal members, and several more sympathisers; it has local, educational-district, revenue-district and state-level organisations. Its activists include doctors, engineers, lawyers, scientists, teachers, government employees, trade union workers, agriculturists and unemployed youth.

During these years the activities of the Parishat have spread into varied fields of human endeavour. Some are well under way while some others are in the initial stages. Most activities are educative, a few are agitative and some are productive.

Public attention was focussed on this movement during its fight to save the unique Silent Valley forests and to expose the unscientific and wasteful electricity and irrigation policies pursued in the State. It takes part also in the fight against irrational drug formulations and harmful drugs and their high prices; it is leading the fight against the Birla's Pulp Factory at Mavoor, Calicut, which is criminally polluting the air and water around.

Today it is widely known all over India because of the very successful *Sastrakala Jatha* held every year from October 2 to November 7. The *Jatha* attracted thousands of people during which books and pamphlets worth Rs. 4 lakhs were sold. The children's science monthly of the KSSP, *Eureka* (for the age group 8-12) has a circulation of over 25,000 copies. The *Eureka* Talent Test attracts over three lakhs of boys and girls from about six thousand schools in the State.

Often we are asked by our friends from outside Kerala:

1. What is the motive force or philosophy/ideology which sustains the enthusiasm of workers and drives them on?
2. What is the attitude of the 'Establishment' towards KSSP?
3. What is the attitude of political parties?
4. How is that such a 'movement' has taken shape only in Kerala?
5. How is the movement financed?
6. What is the impact of the movement on different facets of Kerala Society?

These questions have given us opportunity for introspection.

Today the Parishat has a more or less well definable ideology epitomized by its slogan: "Science for Social Revolution". However, we should hasten to add that the Parishat was not built upon the foundations of a previously defined ideology. It started functioning in an attempt to 'popularise science among the masses'. The present ideology is the evolutionary product of its activities and experiences. It evolved through science jathas, several thousand lectures delivered on "Nature, Science and Society", study and discussion on the "Wealth of Kerala", agitation for better and rational health care system and against environmental degradation, fight for rational energy, irrigation and industrialization policies, and research on contemporary problems of development.

We consider that science is not value free, it can and will have partisanship. Thus viewed, KSSP too is not impartial. But in whose favour are we partial?

There is a minority with ownership and control over resources and a majority without any of these advantages. However, the picture of a rich minority and poor majority is not a static one. There is, we believe, a process of differentiation taking place whereby the rich are becoming richer and the poor poorer. Kerala society, or for that matter Indian society, is not a homogenous one. Parishat is partial towards this poor majority. The relation between these two groups always is, it believes, antagonistic to each other since the motion of one group is the recoil of the movement of the other group.

The 'social revolution' which the Parishat wants to help

bring about is one in which these impoverishment and enrichment processes are reversed and where there is a forward motion of the entire society.

Confidence in such an ideology, evolved through their own experience, provides the necessary motive force for workers. The political consciousness and alertness and the high level of literacy in Kerala might be some of the contributing factors for the growth of this movement. The geography of the State, its smallness and accessibility to every nook and corner, might have also contributed. However, we do not think that the absence of these factors are sufficient to preclude the development of such movements elsewhere in India.

'Establishment', as an impersonal entity representing the status quo, has always been hostile. There are, of course, friends everywhere, always ready to help. The fluid nature of the political situation in the State could be one of the reasons for this. On a number of occasions Government has given us funds for specific activities like distribution of books to rural libraries, organisation of seminars, setting up of an audio-visual mobile unit and a Science Centre. The attitude of political parties towards the Parishat has been generally friendly, though none of them would agree in toto with its activities and ideology. It is very difficult for anybody to take an open anti-science attitude. However, it remains a fact that political parties avowedly based on religions or surreptitiously working for the interests of the rich minority cannot endorse all the activities of the Parishat and they do offer resistance in certain situations.

Publication of magazines, books and pamphlets is the main source of income for the Parishat. This is supplemented by occasional grants (as mentioned earlier) given by Government and other agencies for specific purposes.

It is very difficult to judge the real impact of the movement on Kerala Society. Frankly, we do not know how to measure it. Moreover, being inside the movement we would find it difficult to do so. However, we can at least qualitatively discern the impact of our activities. So far, the techno-bureaucrats of the 'Establishment' had a monopoly of scientific opinion formation in the State, as also elsewhere in India. We have been able to give them a rude shock. Pollution and ecology, the malfunctioning of the health care and educational systems have become

topics of discussion in trains, in streets, at bus stands, in schools and in colleges and also in many public forums. In this sense, we may claim that we have generated a great deal of public attention and debate on issues which we think are not sufficiently brought up before the people.

HISTORICAL DEVELOPMENT

(a) Formative Years

As a concept of organised science popularisation programme, we can trace the history of KSSP to Sastra Sahitya Samithy formed in 1957. The group then formed took such lofty decisions as to translate and publish Darwin's "Origin of Species". But very little could be done at that time. Founder members became otherwise busy and the Samithy ceased to function.

The present organisation of KSSP was formed in 1962 at the initiative of a handful of persons which included some of those who originally floated the Sastra Sahitya Samithy. The main activities were organisation of seminars and publications. The concept of KSSP, then, was that of a forum of science writers. The printed word, through articles in periodicals, was the principal medium for popularisation of science. The membership of the organisation was generally restricted to science writers, and demands for publication of popular articles and books on science were addressed to news papers and publishers.

Even in this limited objective there was an element of novelty as well as of challenge to tradition. In it one can notice the reverberations of a changing society. In the predominantly feudal set up of our ancient society, the language of knowledge (and of science) was Sanskrit; with the British conquest of India, this was replaced by English. However, the multiplicity of languages in the country led to the continuation of English as the medium of instruction and administration even after the British left the country. The science writers, who initially organised KSSP, were raising, in a sense, the battle cry against this attitude. They were demanding that science should be handled through one's own mother-tongue. This demand for importance of Indian languages is related to several older movements. It is related to the national liberation movement and the struggle against feudalism. The leaders of our freedom movement were

arguing for linguistic provinces even as early as the thirties. When KSSP demanded that science should be handled through the medium of Indian languages, it was only echoing this felt necessity of the society.

The socio-political environment in Kerala helped to a great extent the development of this idea. The social reform movement initiated towards the close of the 19th century by Sree Narayana Guru exhorted the socially disadvantaged sections of the society to take up education as a means for overcoming social disabilities. Several of the struggles of the 'backward' communities in Kerala were related to their demand for right to education. The Library Movement and Teachers Movement in the forties of this century reinforced and spread the importance of education in social reforms. These movements were further strengthened by the peasant struggles in Malabar and the growth of a strong radical political movement throughout Kerala. All these factors have made it conducive for the emergence and growth of a Science Movement in the State.

From an all-India context changes in the economy and society were taking place especially after 1947. Capitalism and industrialisation were growing at a faster rate. The inauguration of planning with Five Year Plans led to the establishment of scores of scientific and technical institutions throughout the country. The link between science and technology and economic development was being stressed, both by politicians and experts. 'Science' was becoming important; more and more people were willing to listen to it. The formation of KSSP coincided with this period.

The relationship between the growth of regional languages and capitalism can be easily demonstrated. Newton lived in a period when capitalism was fast growing in England. Initially he used to write in Latin, the language of scholarship in those times. Later he switched over to English. It was Immanual Kant who wrote the first science books in German. Both of them are considered as orthodox scholars. Still they broke the unwritten law of orthodoxy and began to write in common people's languages. The growing bourgeoisie was encouraging people's languages against Latin. It is under their influence that Newton and Kant wrote in their own languages.

The KSSP came into existence as a necessity of the times.

The formation of Sastra Sahitya Parishat (Malayalam) at Bombay by a few scientists working at the Bhabha Atomic Research Centre was a turning point for KSSP. With the help of SSP (M) Bombay, KSSP started the publication of *Sasthragathi*, then a quarterly. This was the beginning of the publication activity of the Parishat. It began to change, gradually from a forum of science writers to a forum for encouraging and moulding new science writers. Simultaneously the SSP(M) Bombay started work on adapting the glossary of technical terms *(Paribhashik Shabda Sangrah)* from Hindi to Malayalam. It did a herculian job of preparing a glossary of technical terms in Malayalam with the help of KSSP containing about forty thousand words.

The fourth annual conference of KSSP held in Trichur in 1967 adopted a Constitution for the KSSP and it was registered as a society under The Societies Registration Act of 1860. It may be noted that it is only after 10 years of existence, first as a concept and then as activities, that the organisation took a formal shape.

During 1967 another event, which was to become a turning point in the development of scientific literature not only in Malayalam but also in all other Indian languages, took place. Dr. Triguna Sen became the Education Minister at the Centre, and for the first time recognised that the Central Government had responsibilities not only towards Hindi, but also towards other Indian languages. Each State was given Rs. 10 million for the development and production of text books for teaching at the university level. On the initiative of Sri. E. M. S. Namboodiripad, then Chief Minister of Kerala, this amount was utilised to set up a State Institute of Languages in Trivandrum. The Institute was set up with personnel recruited largely from the KSSP. This led to two consequences: firstly, a concentration of KSSP activists at Trivandrum, in addition to Calicut, and secondly, a period of live collaborative activity of KSSP and the State Institute of Languages. This helped, on the one hand, to stabilize the Language Institute and put it far ahead of all other similar institutions in the country and enabled the KSSP, on the other hand, to spread in different parts of the State. The first publications of the Language Institute, *Vijnana Sabdavali* and *Manavika Sabdavali* were largely the result of the

work done by KSSP during 1967-'69. Several dozens of seminars, symposia and workshops were organised under the joint auspices of KSSP and the Language Institute. A number of workshops were conducted to translate books from English to Malayalam.

The KSSP began publication of its second monthly, *Sastrakeralam,* in 1969 for the age group 12-16 followed by a third one called *Eureka* in 1970 for the age group 8-12. The publication of these two magazines and the joint activities with the Language Institute resulted in increased contact with the sphere of formal education. A few books were published by KSSP during this period. *Science 1968*, *Science 1969*, *Parichaya Kosham* (introducing science writers in Malayalam) and a comprehensive bibliography on science books published in Malayalam. More and more school and college teachers began to join the activities of the Parishat. The membership began to approach four figures. The membership from 1962 to 1967 was only 30 or 40. In 1968 it was already over two hundred.

Thus (to recapitulate), the formative decade, 1962 to 1972, saw the following developments:

(1) *An initial phase of formation, 1962-67:* There was only a loosely knit grouping with membership spread throughout the State. This however helped to underline the all Kerala nature of KSSP from the beginning. The main centre of activity was Calicut and seminars and symposia were the major forms of activity. The target group was the public in general and the medium resorted to was the printed word.

(ii) *Development of an organisational structure:* The period 1967-72 witnessed the development of an organisational structure. A constitution was adopted, the organisation was registered as a society, and local and district level organisations and committees were set up. It also saw the spreading of activity to schools and colleges. The spoken word became as important as the printed word.

(iii) *Qualitative change in the composition of membership:* From 1967 there was also a qualitative change in the membership. In the beginning the members were mainly engineers, scientists, college teachers and a few prominent social workers with social commitments of varying degrees. In the second phase, 1967-72, more and more school teachers and persons from other walks of life began to join the KSSP, with more active

commitment and willingness to spare time for organisational work.

(b) Into the Streets

Already by the end of what we have characterised as the formative phase, a major new feature of KSSP's activities was beginning to take shape. In 1971-72, after the eighth annual conference at Ernakulam the delegates went in a procession shouting slogans on science, to a public maidan where a senior Professor of Chemistry gave a 90 minute speech on chemistry in day to day life. The public, relaxing in the nearby parks, were surprised and delighted to hear chemistry from a maidan mike. Next year, a one day jatha was organized on the occasion of the 9th annual conference at Thiruvalla. Three car jathas which included professors and principals of Engineering, Medical, and Agricultural colleges converged at Thiruvalla. On the way they were given receptions at several places, where they gave lectures. They found common people extremely interested in science. More importantly, they saw themselves, as frogs in abysmal wells of blissful ignorance of people's problems and perceptions.

Thus began the massive mass contact programme of KSSP which was to become one of its most important activities. The Bharathiya Vijnan Patrika Samithi, an organization of science periodicals in Indian languages sponsored by the Council of Scienific and Industrial Research (CSIR) suggested that the first week of January every year may be planned as Science Week; KSSP responded. It planned one thousand lectures on "Evolution of the Universe, Man and Society", from 1 to 7 January 1973. More than 1200 classes were held. This was later to become one of the major continuing programmes of KSSP as well as to lay the basis for its understanding of scientific attitude and method.

In the meantime involvement of KSSP in non-curricular activities in schools became more widespread. The State Government has been trying to organise and activise 'science clubs' in high schools, through circulars and orders, but without much success. School teachers involved in KSSP took up this work as a campaign and in two years, 1973-74, about 1500 high schools had science clubs, all of them affiliated to KSSP. Under various

schemes many of these schools have been provided with kits and audio-visual aids. But for various reasons they were all under lock and key. The 'open the kit' campaign which KSSP launched at that time has been only partially successful. However, from this period onwards school teachers were to become the mainstay of KSSP.

(c) Introspection and into the Villages

1974 should be considered another turning point in the history of KSSP. Many activists in the KSSP working for the past 6 to 8 years, were gradually becoming conscious of the fact that things were moving only at snails pace, that their work was having little impact on the society, that the gap between science and society was becoming very large, that confining themselves to educational institutions with occasional outbursts of seminars and campaigns limited their scope. A process of introspection went on for some time with occasional discussions. Gradually it became obvious that unless we face and address ourselves to the economic problems of the society, our efforts were bound to be extremely superficial. In Kerala, like anywhere else in India, economic activity is predominantly agricultural and agro-industrial, and hence rural. So far KSSP had been functioning mostly in urban and semi-urban centres. As a result we conceived a programme, in which one hundred activists of KSSP would take, 10-12 day's leave during the summer holidays, go to a village, stay there, study the economic, social and cultural life there, identify the S&T elements in them and operationalize the KSSP activities on that basis. This never materialized. But the idea spread and the concept of Rural Science Forum emerged. Since then this concept has undergone substantial changes. However this marked a significant change in the perspective of KSSP.

The eleventh annual conference held at Trivandrum accepted 'Science for Social Revolution' as the slogan of KSSP. By then KSSP had come to use the term 'science' not in its narrow disciplinary context of identifying with bio-physical sciences but in its fundamental sense of embracing all fields of human knowledge. This was in response to its attempt to understand the link between the physical and social realities. At first we had only a very vague and hazy idea of what this 'social revolution'

should be. All of us agreed that the majority of the people lived in wretched conditions, that it was possible to improve their lot, that they were fighting, in their own way to emancipate themselves and that 'science' should help them in this struggle for a better tomorrow. We felt that we should discuss in detail and share our experiences and our aspirations. But formal executive committee meetings were not suited for this purpose. Thus was born the idea of 'workers camp' which became since then an important annual activity. These annual camps have played an important role in forging that feeling of brotherhood and enthusiasm among the workers of KSSP, which is perhaps the most important source of motivation for all of us. The community life with its stoic simplicity and the total involvement, temporarily forgetting the external world, has always been an exhilarating experience.

(*d*) *Philosophical Orientation*

In 1976, we planned to repeat the mass lecture programme but in the form of study classes with a different title, "Nature, Science and Society". About 100 activists were given two day's training based on specially prepared notes. There was much enthusiasm as well as a feeling of challenge in conducting classes on a topic to which the common people were never before exposed. The socio-political climate also was exceptionally convenient for involvement of teachers en masse in this campaign. During the period from January 1 to 31, 1976 nearly 12000 classes were conducted instead of 3000 as originally planned. 'Science in History' by J. D Bernal was one of the main sources on which the text for the classes was prepared.

Organizing this campaign gave us an opportunity to develop our own understanding of the history and philosophy of science, which gave more meaning to our task of developing a 'scientific' attitude among the people. Also, we were gradually becoming aware of the potential of campaigns to focus the attention of the common people. So we planned our next campaign towards the end of 1976 and beginning of 1977. It was realized that the campaign should focus on the immediate economic environment and comment on the existing economic process and development activities. For this purpose, a book was designed and written by

a team of experts drawn from specialised and advanced institutions of research and learning in Trivandrum. Some of the members of these institutions had, by then, become activists of the KSSP. The book was titled as "Wealth of Kerala". Apart from offering a critique of the existing process of economic development, it attempted to provide an alternative approach and perspective for economic development of the State. This has been widely acclaimed as one of the best books ever published in this field and it has seen through several editions. Preparations for this book and the subsequent campaign were steps towards another field of activity.

(e) Diversification

KSSP had, by this time, become quite well known. Its activists included engineers, technologists, doctors, educators, environmental scientists, economists—in fact serious students of all subjects. We were in constant touch with the people and had a sense of commitment. We had to respond to issues relating to development of energy, irrigation, education, health and pollution control. What we had to say was listened to seriously at least by a significant section of the public as well as decision making groups. We found ourselves collaborating, in our way, with the State Planning Board in carrying out economic surveys and in formulating Plan proposals in certain key sectors. In any serious discussion or workshop or seminar on education there was a representative of KSSP.

Our knowledge on the resources of Kerala, and their utilization, combined with the unique nature of our team-work led to different specialised studies. However, we should, add here that these studies were not taken up on our initiative but in response either to requests from people in the respective areas or as a result of the public controversy, as in the case of the Silent Valley Project. Viewed in this sense, the studies may be referred to as products of our action-research. The first such study was the ecological consequences of water control projects in Kuttanad. Before publishing this study, it was discussed with a cross section of people from Kuttanad during our annual conference held in Kottayam in 1978. We also published a report on the Silent Valley Project, which is now widely known and which made us also known far and wide. Other studies

include pollution in Mavoor (Calicut) and Punaloor (Quilon) which also led to agitations and campaigns. We also took up the campaign against harmful and useless drugs in the fight for better health care system. Following these activities an Environment and Health brigade was formed. All these demanded more and more cadres with higher levels of intellectual equipment. Thus we began a regular internal training programme which we call cadre training programme.

The *Sastra Samskarika* (Science Cultural) *Jatha* of 1977 was yet another landmark. It lasted 37 days, from October 2 (Gandhi Jayanthi) to November 7 (October revolution and the birthday of C V Raman), travelled 11,000 kilometers, partook in nearly 900 receptions and addressed nearly half a million people. That was an unforgettable experience. The entire Parishat worked for it. The slogans shouted were powerful and musical. It was this experience which was later to lead to *Sastrakala Jathas,* a regular feature from 1980 onwards. Science in its broad sense is taken to the people through the media of (a) the printed word—books pamphlets and posters and (b) arts—songs, skits, street plays, folk arts etc. The *Sastrakala Jatha* is a massive effort, involving the effort, of several thousand members and sympathisers of the Parishat. Besides being an occasion to propagate printed material worth several lakhs of rupees, it also helps to recharge the workers, to recruit new workers and to identify new areas of activity.

MAJOR ISSUES TAKEN UP BY KSSP

(a) Nature, Science and Society

This is a course of lectures leading to the development of a historical and philosophical sense of science. Depending on the availability of time the essential aspects of this series can be conveyed in three hours to twelve hours. It can be extended into a full year course also.

After introducing the idea of matter, substance and object (increasing degree of concretization) as well as elements, a description of the universe, from fundamental particles to far off quazars is given. The essential point stressed here is that everything is in motion, there is nothing without motion and that

motion is the mode of existence of matter. Then two questions are raised. What is time? and what is space? After analyzing our understanding of both space and time it is concluded that space and time are specific ways of understanding motion of matter, and that they cannot be separated from matter and its motion. There is no space or time without matter. The concept of matter-space-time continuum is thus established. Afterwards, the question of the origin of universe is analysed and since 'origin' means prior non-existence and since 'prior' (i. e. time) cannot exist without matter we come to the conclusion that the question is absurd, that the UNIVERSE always existed.

Later we follow the course of evolution of the solar system, the formation of living things from the non-living, the evolution of living beings, the transition from ape to man, the role played by labour and collective life in this transition, the evolution of human society through the paleolithic, bronze and stone ages, from primitive society to slavery, feudalism, capitalism and socialism. The corresponding growth in science and technology too is analysed. Here again, in the realm of social reality, motion i. e. change is emphasised.

(b) Scientific Outlook

The phrase 'development of scientific world outlook among the masses' is a much repeated cliche. KSSP also repeats it. Naturally one should expect the question: what is this scientific outlook? Our own understanding of the scientific outlook is derived from a study of the historical development of science tracing the origin of botany in fruits and root gathering, zoology in hunting, of material sciences in tool making, of dynamics in primitive weapons, and so on. In the early times 'science' was synonymous with daily life experience. Hence, direct intervention with nature, was the beginning of all knowledge. However just as we created the abstract 'tree' from the concrete mango, jack and tamarind, the abstract 'bird' from crow and eagle, those raw experience are abstracted leading to new forms of intervention with nature. This means: from practice to theory and from theory to higher forms of practice. Practice is the starting point. This understanding forms the foundation of 'scientific outlook'.

(c) Science for Social Revolution

This is the slogan of KSSP. What does that mean? A short outline has been given in the introduction. First and foremost, it involves a critique of science in India today.

Every country has a 'science policy'. India too has one. The policy could be explicit or implicit. The explicit elements of India's science policy are well known. They are common sense conclusions. One need not elaborate them.

But the dynamics is not governed by the external, the explicit, but by the internal, the implicit. Material resources and incentives, and recognition by peers in lieu of the public are the essential requirements for growth of scientists and hence of science. The realities of these two factors form the basis of the 'implicit' policy. To put it in concrete terms, these means:

(a) Funds, equipment, promotion, power etc. and
(b) Publication in respectable foreign journals and/or governmental recognition through awards and appointments.

About 90% of research funds in India is expended through Departments of Atomic Energy, Space, Defence, Agriculture and CSIR 'Laboratories'. How do the scientists in these laboratories and departments formulate their research problems? Most of them obtain it from international publications, frontier areas of research in advanced nations, who in turn get their problems from the requirements of their economy. Indian scientists are more versed with the problems of advanced nations than those of India. They would feel more at home in UK or USA, not because of their style of living but by their way of thinking. They cannot be blamed for that. It is but a reflection of the Indian society, which can be broadly divided into (a) a rich, high technology, high consumption minority and (b) a poor, low technology, low consumption majority. The former identifies itself with the people of advanced countries in its outlook and requirements. It owns the means of production in this country; it controls the state apparatus; it dictates, implicitly and sometimes explicitly, through provision of material resources and recognition, the S&T of this country. The problems of the poor majority, except that of food, are alien to rich minorty and to our scientific community.

The characterization of Indian society as poor and rich is very much a static one. There is a process of impoverishment and, its converse, enrichment going on. So one can say of a group that is getting impoverished or facing the threat of impoverishment, and of another group that is continuously getting enriched. The former constitutes the majority, the latter, which controls the means of production and the organs of state forms a very small minority. As long as this remains so, the character of S & T too will remain as it is today with all the epithets we can shower on it: elitist, foreign-oriented irrelevant, etc. The bulk of the scientific community will either be preoccupied with exotic frontier research or degenerate into clerical scientists. The motivated minority can either engage in some form of microlevel activities, hoping, that someday these will become useful and that till then they will ameliorate the conditions of a few at least, or they can consciously mould themselves into crusaders against the prevailing unscientific and unjust society. In adopting the second alternative there is a danger of donning the attire of a Don Quixote. This should be avoided. It is in this connection that one should look into the slogan 'taking science to the people'.

It is unnecessary at this stage to dwell at length upon the social origins of science. We are well aware of it. We are not taking to the people something from outside. Science is within the society but has been alienated from the people. It should go back to them and in their hands turn into a weapon in their fight to transform the society. It is futile to suggest an alternate approach to S & T in general. For the past decade and half or for even more time we have been suggesting 'alternatives'. It has been no more useful than reciting Gayatri mantra every morning. At the moment we should be interested in finding out what the scientists and technologists can contribute to the struggle that is being waged by the people. They cannot afford a detached attitude. They have to get firmly involved in the problems of the overwhelming majority of the people and in their struggle to gain control over the means to slove them. This does not require large physical resources. Moreover, the resources that are put in their control can be and should be utilized for this purpose. This will invole unique forms of struggle both within the walls of the 'laboratory' and outside. This struggle, however, should

and will give them immense satisfaction. In the process, they would also learn to derive as much satisfaction from the recognition by the people as from recognition by 'peers' for contribution to forntier science.

This is not to denigrate 'frontier science'. There are many forntiers. At least a few scientists should be interested in 'frontiers' of relevance to the people. They may be jeered at. Taking science to the people is often considered as an 'unscientific' or 'nonscientific' activity; it is not considered a revolutionary activity either, which in reality it is. In the hands of the people S & T can become a powerful weapon, as powerful as it is in the hands of their oppressors. The KSSP views the arming of the people with this weapon as its responsibility.

(d) Energy and Development in Kerala

KSSP had the occasion to study the overall energy situation in Kerala, the conclusions of which are being discussed at various levels. Unfortunately, the energy planners of the State are oblivious of the critical situation. We came to the conclusion that at present Kerala, with no known reserves of coal or oil, is a highly energy deficient state, that the concept of plentiful hydro-energy is in fact a myth, that domestic energy position is becoming more and more precarious and that the concept of electricial energy as a commodity to be sold for profit is wrong. When KSSP predicted a shortage of electrical energy as far back as 1975 the policy makers and officials of Electricity Board laughed at it. Today Kerala is experiencing a 40% cut in electricty consumption due, mainly, to the short-sighted policies of the concerned agencies. We had advocated large-scale import of coal from the coal quadrangle of India, establishment of coal fired thermal stations (the accompanying problems of pollution of such plants should be amenable to control by the available technology) and argued for the establishment of coal dumps and briquetting plants at various centres and massive propagation of higher efficieney coal - burning and wood-burning stoves for domestic purpose. But the State Electricity Board is still dead set against coal stations and the government has not understood either the economics or the ecological importance of higher efficiency wood-burning stoves. The KSSP is going about, in its limited way, propagating them. It has conducted domestic

energy consumption studies with practically no expense which but has given sufficiently accurate data. The projection of electricity demand it has made is being proved to be more accurate than those projected by KSEB. KSSP maintains that for the next 20 years at least, till solar energy becomes really commercial, Kerala has to import coal or fall back in its industrialisation drive. KSSP is opposed to nuclear power plants for two reasons.

(i) today they are unreal and costly, the 'technical' problems are too many, it involves much extended period of construction and the energy is much more costly than from coal-burning thermal stations, and,

(ii) with such a high density of population as in Kerala, the consequences of a major nuclear accident is unimaginably high.

(e) Irrigation

After its people, the most abundant wealth of Kerala is water. With an average of 3000mm of annual rainfall the steeply undulating topography can be considered either a boon or bane, depending upon the way we see it. Study of the experience of the construction and utilzation of major irrigation projects in the State has led us to the following conclusions:

(i) They have not served the purpose of providing irrigation water at the required places, at required times and in required quantities. This is due to two reasons (a) necessarily non-uniform agricultural practices causing management difficulties and (b) consistent overestimates of projected benefits and exclusion of its adverse effects.

(ii) The average capital cost of irrigation projects that are completed so far works out to Rs. 30,000-40,000 per hectare, which is incredibly high.

(iii) Aggressive hillslope management has led to deforestation, soil erosion, floods and droughts. Therefore the future prospects are extremely dark.

(iv) The most urgent need of the day is to make an all out effort at afforestation of hill slopes, terracing, reducing runoff and increased reliance on ground water storage.

(v) Minor irrigation schemes for tapping either surface or

ground water can be managed better and are, definitely, much cheaper. They can be executed and implemented in a decentralised framework saving considerable time and resources.

(vi) No new major irrigation projects should be taken up, those projects in which only less than 20% of projected capital investment has been expended should be shelved for the present and all the available resources should be pooled for *local* irrigation projects (local being a more meaningful term than minor).

(f) Ecology

KSSP has become known all over India and abroad because of the stand it has taken on the Silent Valley Hydroelectric Project. Our stand on this project as well as on any other project, may be stated in the following way:

(i) The cost-benefit analysis made by promoters of projects has a tendency to underplay costs and exaggerate benefits. It is in the interest of the nation to have a 'devil's advocate' to face the issues squarely and focus public attention.

(ii) Much of the hidden social costs is either neglected or underestimated. The adverse effects of this are not marginal.

(iii) There should be an Environmental Impact Statement accompanying each project, which can be debated publicly. There is neither sufficient expertise nor realization of the necessity for such studies in the various departments of the government.

(iv) Though there is much talk on the dangers of hillslope deforestation there is no realization on the part of the government as to how serious the situation has become.

(v) Timber is big money. Unemployment is very high. Big money can purchase unemployed starving hands to work for it. Food today is more important than ecological stability of tomorrow for the unemployed and the starving. Educating and agitating for tomorrow is a vrey difficult task. However only the people, conscious of the ecological implications, can save the forests, no governmental agency can save them.

On the Silent Valley Project our stand has been the following:

(i) The Silent Valley is biologically one of the richest and the oldest and the least disturbed tracts of forests in the whole of India.

(ii) It is the largest contiguous stretch of forest in the Western Ghats which can be protected.

(iii) The amount of energy that can be obtained from it is quite small.

(iv) Irrigation potential of the project is exaggerated.

(v) Energy and water for the local population can be made available much quicker and surer as well as cheaper from alternative sources.

(vi) Therefore, this project should be taken up as one of the last-hydro electric projects in Kerala, and even then only if absolutely necessary. In the meanwhile more detailed study of the flora and fauna of the region should be made.

(g) *Pollution*

Though Kerala is not an industrialized state even by Indian standards, its industrial area, Alwaye - Cochin belt, is one of the most polluted regions in the world. It is nearly a decade since we had started campaign against pollution. The State machinery, such as the Kerala State Board for Prevention and Control of Water Pollution, is known more for its inaction than for anything else. Only where the affected people have resorted to united action some results have been achieved. A classic example was that of the Chaliar river, which was polluted by a pulp factory at Mavoor owned by the Birlas. KSSP joined the struggle of the local people, conducted a study of the nature and causes of pollution and unleashed a major campaign against the polluting activity of the factory. People became familiar with the scienific and technical aspects of the pollution and this gave strength to their struggle. They could not be misled by the factory any more. The struggle was only partially successful. But, it has raised more fundamental problems of employment and other dimensions of industrialisation. People are now agitating against pollution in several other places. Due to lack of sufficient

cadre, KSSP is not in a position to give continuous local leadership to them. However, people are getting more and more conscious about pollution and the reasons thereof.

(h) Education

With more than 60 percent of its cadre drawn from the field of education, coupled with continuous contact with students, it is but natural that KSSP has something to say about education. Based on its varied experience the KSSP has prepared a 'Document on Education' dealing with the system of education up to the secondary school level which is now being discussed at various levels. The major issues raised in the document are:

(i) The purpose of education is to develop the personality of the individual to the fullest extent so that (a) he/she should be able to discharge effectively and efficiently the functions entrusted to him/her by the society and to contribute to the onward march of the society and humanity, (b) he/she should be able to appreciate the cultural heritage of his/her people and humanity as a whole and (c) he/she should be able to resist and defeat forces which come in the way of realization of the above two objectives.

(ii) Present education does not serve this purpose. Instead of helping the development of the society it alienates the student from productive labour as well as from his/her own culture.

(iii) Teaching methods destroy every initiative in the student. Examinations are so designed as to weed out the poor and the 'backward'.

(iv) The value concepts imparted are anarchic. It is an education to live in and to perpetuate a competitive society. Our society is in transition. Education, instead of helping it, opposes this transition.

In the document we have tried to develop a methodology for curriculum development. We have suggested a new structure, composition, and examination system. We have stongly advocated the mother-tongue as the medium of instruction and deprecated the growing tendency of 'mummy-daddy' schools in the private sector and the immense harm they are doing to the children and

to the society. When we emphasize the role of mother-tongue as the medium of instruction, we are not unaware of the need to learn other languages, both Indian and international. The former emphasizes the development of the mental faculties of the child while the latter is intended for communication, interaction and building up of fraternity with people from other parts and countries.

(i) Health

KSSP has been active in the field of health for the past four or five years only. Obviously the greatest health problem is poverty. Food is the best medicine we can give to the poor. Majority of the ailments arise from inadequacy of proper food and unhealthy living environment.

One of our activities in the field of health has been holding health camps. This is not intended as an ameliorative measure but more as an educative measure. We have conducted several dozens of camps and hundreds of doctors have participated in it. Apart from organising health camps, a number of our publications deal with people's health. The active cadre of KSSP has a few doctors in it. We are in touch with Medicos Friends Circle, VHAI and other groups working in the field of health. Based on our experience, our approach to people's health may be summarised as follows:

(i) Health care delivery does not mean provision for treating the unhealthy, but to keep the entire people physically and mentally healthy.

(ii) Health care should be recognised as a basic right of citizens—it is not the charity of the government or other institutions.

(iii) Health care does not and should not mean only hospitals and drugs.

(iv) Today, the modern health care system in India is controlled by the multibillion dollar multinational drug companies. Our hospitals and health programmes are markets for their products.

(v) The people have to wage a war against these companies to save themselves from harmful and useless drugs, which have been banned in most of the developed countries.

(vi) Health of the people can be assured only through the combined and cooperative efforts of Health, Education and Public Health Engineering Departments. Preventive and social medicine cannot be allowed to be made a mockery.

(vii) There is a wealth of medical knowledge in traditional systems, especially in Ayurveda. They should be integrated and made one with the system of health services. The vested interests of both, practitioners of modern medicine and of Ayurveda, should be fought against.

(viii) Today Kerala is producing one doctor for every 900 new born children. It is high time we shifted the accent from doctors to para-medical staff, especially nurses and other health workers.

(xi) Medical education has to be thoroughly reoriented to incorporate the above aspects.

KSSP has made use of the medium of people's arts to propagate these ideas. But it is quite aware of the fact that the fight against the multinational drug companies, which is what the fight for a genuine health care system really is, will not be a simple one or a peaceful one. It is heartening to note that the medical and sales representatives' association is with us in this fight.

RELEVANCE OF KSSP AND PSM IN INDIA

Half the world's total poor people, who are also illiterate people, live in India, which claims to have the third largest man-power in science and technology. The conscientious amongst us feel a terrible moral anger and want to do something. But doing 'something' in plain anger will not result in anything but self-destrucion.

To understand that poverty and squalor of the majority are the necessary outcome of the existing economic system based on excessive consumption by a minority, competition and private profit, we do not require any scholarly research. Those of us who are discussing these problems have understood this. However the majority of the people in India do not understand this. They are ignorant of the natural and social laws which govern

their lives. Once they become aware of these laws, their fatalistic world outlook will change into a scientific one.

Two factors influence such a change: first, the knowledge of the laws of nature and society; second, participation in the productive activity of the society. The first is obtained from science and the second from life experiences of those who engage in productive labour. One of the functions of mass organisations is to help its members to collectively analyse and organize their experience and to arrive at valid conclusions therefrom. Those who are not members of such organizations (and those in organizations which have not developed this analytical capacity) are still prisoners of their own world. Ignorance of the laws of nature and society makes it difficult for them to analyse their own experience. They should have correct knowledge of the situation in which they are and act according to that knowledge. Some persons think that they are leading the people out of poverty. This is a wrong notion. The people at large have to save themselves. Individuals cannot save them. All such attempts have only pushed the people into deeper suffering. KSSP has given itself the task of helping the people to understand their own physical and social environment, the various forces and counter-forces present in it and thus enable them to analyse the situation for themselves — physical environment is important because it interacts strongly with the social environment. Due to historical reasons it has become the responsibility of PSM's to give leadership in this integration. KSSP is conscious of this.

FUSING SCIENCE AND ART FOR THE PEOPLE

It could be an open ground in front of a primary school or a village library or even a temple in a Kerala village. A crowd of a few hundred people waits eagerly. At the centre of the crowd is a vacant area — about 30 ft in diameter. Only a couple of chairs and a microphone are kept there. Care seems to have been taken not to have blaring loudspeakers but only box-type ones.

At the appointed moment there is the sound of beating of the traditional Kerala drum *(Chenda)*. The crowd turns to see a procession of 15 to 20 persons led by a girl with the banner of the Kerala Sastra Sahitya Parishat. They are dressed in vermilion-coloured *dhotis* with red waist-band and white headgear but no shirts. Only the two girls wear shirts. Within a couple of minutes the procession, known as Sastra Kala Jatha, arrives and the participants take their position at the centre of the crowd.

The manager of the Jatha announces that they are all activists of the KSSP which raises the slogan of "Science for Social Revolution" and have come here as part of their mass contact programme to present a few items dealing with contemporary issues and seek their reaction.

The programme starts with a group exhorting the people to understand the importance of learning. 'You who starve, reach out for a book' — invoking these lines of Brecht they spring into action, presenting different formations with the human body conveying the message of the song. As soon as it is over, the group gets ready for the next item, *Thathamme Poocha Poocha* (asking the parrot to beware of the cat), a play on the plight of the present educational system. A satire with considerable exaggeration, the play moves the crowd to waves of laughter.

A report on Science-Cultural March published in MAINSTREAM, November 27, 1982.

On the one side it depicts the plight of a Malayalam school, without furniture, a sleepy and day-dreaming poor teacher, dilapidated building and a crowd of careless but playful students who have no books or any other aids. On the other side, it depicts the craving for admission to English-medium schools, with their capitation fees, strait-jacketing of children into an artificial environment and behaviour and systematic cutting of their roots from the social environment.

The play is followed by *Ottam Thullal*, a satirical folk dance of Kerala, which presents the disservice of the State Electricity Board in the name of providing electricity to the people. A couplet says that one could see the light of the bulb with the help of light from a kerosene lamp.

The next item, "Kerala: Yesterday, Today and Tomorrow", is a musical composition rendered by two artists with the others depicting different scenes as the song goes on. It starts with a pop song as sung by modern youth with all the paraphernalia symbolising ape-like imitation of the West. When a stranger comes and makes fun of them the singers stop the song, and the real one starts. It unfolds Kerala's history from the time of the arrival of the Aryans (the Namboodiris) who, with their self-imposed religious superiority, become feudal chiefs alienating the masses from their land and spread the rigidities of the caste system. The petty chieftains engage in petty quarrels, and this is taken advantage of by the Portuguese, the French, the Dutch and finally the British, all of whom primarily came for trade.

With the dawn of Independence, other problems emerge. Liquor barons sell poisonous liquor but are supported and protected by politicians, while the masses suffer because of price rise, unemployment, casteism and various other forms of exploitation. People lose faith in everything except one thing — money. Mark-lists are available for a price and so are many other things: job, status, awards, etc. Social life becomes the sum of a number of commodities.

But the song ends not in despair but in hope; yes, hope built on the solid foundations of the unity of the suffering masses who become aware and are able to see through the games of their perpetrators. When this happens, victory is assured.

There are many other items such as problems due to pollution of water and air and the dialogue of two groups for and

against the protection of forests presented through the folk dance of Parichamuttu Kali. Corruption in public life is portrayed through an effective play called "Office", while another one, "Hell", depicts the state of public hospitals. A totally different theme — the evolution of man — is dealt with through a powerful *Sangeetha Silpam* called "Ekalavya's Thumb". Through another folk dance called *Kolam Thullal*, the ultimate liberation of science by the common people from the clutches of the evil forces and vested interests is depicted. This is titled *Mochanam* (Liberation). The demons or Kolams in the item are the forces of coercion (police), corruption and cheating (black market).

The team presents as many items as can be accommodated within the specified time which ranges from one to two hours in a given place. They then move on to the next village.

Thus the Sastra Kala Jatha comprising two teams, started on October 2 from two ends of Kerala, concluded its march on November 7 at Cherai, a coastal village in Ernakulam. During the 37-day march, the teams covered more than 400 rural centres and they were received by more than four lakhs of people. The occasion was utilised to propagate the publications of the KSSP which spearheads a people's science movement in the State. The just concluded Jatha was the third of its kind organised by the Parishat within the last three years. The heart-warming responses the Jatha received and enthusiasm of the artists have prompted the KSSP to undertake such programmes annually. On every occasion, books and pamphlets worth more than Rs 2,00,000 were sold out, and small contributions collected from the people amounted to more than Rs 15,000. These contributions, together with the local hospitality provided by the villagers, took care of the expenses involved in travel, food and other items for the Jatha. Apart from these, no other source was or had to be tapped.

What is it that has contributed to the success of the Sastra Kala Jatha? How it is that folk art could be fused, without sacrificing its aesthetic quality, with the content of modern science and contemporary social problems? To find answers to these questions one has to look at the history, nature and objectives of the KSSP which has raised the slogan of "Science for Social Revolution". Started with a dedicated band of intelligentsia who voluntarily sought to popularise science by writing in

simple Malayalam, the group has now bloomed into a mass organisation of about 7,000 members with more than 1,000 activists covering a cross-section of the population. However, it mostly consists of school teachers and a mixture of scientists, professionals, students, workers and the 'gainfully' employed.

While it relied and continues to rely on the printed and the spoken word, the KSSP felt that the medium of folk art should also be used to make communication effective. Without relying on professional expertise, the KSSP initiated a series of discussions and camps wherein talented activists were given intensive training in various items for which the scripts were prepared by others.

Through such a fusion of themes, talents and the medium of folk art with its contemporary variations as expressed in street-plays and the use of the human body for the inanimate setting, a variety of programmes were developed. These items went through their own evolutionary stages as the Jatha moved from one place to another integrating with it the experience and reactions of the people. The advantage of such a mode of presentation was that it dispensed with the need for a stage and make-up, locational specificities, and above all the practice of 'separating' the artists from the people.

However, the tremendous response generated could not possibly be due to the mode of presentation alone. The themes dealt with and the manner in which the message was conveyed created a feeling among many people that the sharp edge of social criticism has not yet been blunted and that while many mass organisations have been shying away from their responsibilities, new ones are emerging, equipped with the power of reasoning and analysis. That this has been attempted within the framework of the relationship between nature and society do lend credence to the claim that a scientific approach to social problems could be attempted on a mass scale.

SASTRA KALA JATHA UNMASKS PERPETRATORS OF EVIL

The "liquor barons" who get away after selling poisonous liquor, the industrialists who pollute the environment, men who denude the forests, the "elite" of the society who are crazy about English-medium education and manipulate mark-lists to get admission for their children in medical colleges, the "white elephant" that is the Electricity Board, the Government that imports rubber to the detriment of the farmers and above all, the system that sustains all of them, were the target of attack of the 'Sastra Kala Jatha', which staged its programme in Trivandrum on Saturday.

Importance of science

The jatha was the third to be organised by the Kerala Sastra Sahitya Parishat since its inception in 1980. Its purpose is to inculcate the importance of science and wipe out superstition and to unmask the perpetrators of evil.

Two teams travel the length and breadth of the whole State arranging programmes whose technique of presentation is inspired by the folk arts and folklores of Kerala. The programme in Trivandrum was staged on a conventional stage. The organisers had fixed the schedule in the middle of the tour, obviously with a view to giving the performers an opportunity to perfect their acting skills.

The programme was well received by an invited audience. The children who accompanied their parents seemed to be the happiest because of the brimming humour.

Some of the items, normally noted for their stinging social criticism, had a commentary which went to the extent of saying that even the courts protected the wrong-doers.

Report on the Science-Cultural March appeared in the Hindu, November, 1982.

All new faces

The programme began with a musical based on the composition of Bertolt Brecht. The lines celebrated the importance of learning.

The participants in the jatha were new faces except for the manager and a few actors who were there in last year's jatha. The checkered dhotis had given way to vermillion-coloured dhotis and white headgear, while the old red waistband was retained. Two female performers, both students, were included for the first time.

The second item was a song about the failure to adopt Malayalam as Kerala's official language. This was followed by a short play on the craze for English-medium education. This went very well with the audience. Exaggeration was what created humour and symbols were used to convey the message.

The play decried the capitation fee and the pressure put on the children in teaching them a foreign language at a tender age. In presentation, the show this time was a considerable improvement on last year's.

The next item 'Kerala—yesterday, today and tomorrow', depicted the history of the State, from the time the Aryans came and spread casteism, to the coming of the British, independence and then to the present.

The present was characterised by the price rise, inflation, unemployment and a host of other maladies. Liquor contractors, who sell illicit liquor approach the courts for escape from punishment and anybody can buy a degree. The piece was greeted with loud applause.

The law is flexible according to the needs of the rich, but the time would come, it was stressed, when the depressed and the poor would rise to claim victory. Nobody would be able to stop them.

Pollution

The play 'Poison' described the travails of the people affected by pollution. Pollution Control Board files a case against the factory owner who is an industrial giant, but he escapes punishment saying that the machines are responsible for the

pollution. But the sole blame for the factory-owner's escaping action under the law is put on the courts.

"Ottam Thullal," a satirical dance form of Kerala, was employed to have a dig at the State Electricity Board. The electric bulbs, so go the couplets, could be seen only in the light from the kerosene lamp. The composition for the "Thullal", however was of low quality compared to the lines of the originator of the Ottam Thullal, Kunjan Nambiar.

"Chavittunatakom", a folk art that was once popular among Christians in the State, came in handy for the jatha in criticising the import policy and unscientific measures introduced in the agricultural field. Two farmers lament about how the agricultural officer made them cultivate cocoa after uprooting their tapioca crop. But the price of cocoa comes down steeply when their new plantations start production.

The play 'Yantram' (machine) was about the education system which fails to effect the development of the pupils, but renders many of them 'disabled' in many respects.

"Parichamuttu Kali" drew the viewer's attention to the destruction of forests and the inanition of developmental activities.

The musical "Ekalavyante Peruviral," dealt with the forces that tie down mankind on his journey to progress.

Freed from tradition

The "Kolamthullal", named "Mochanam", presented the ultimate freeing of the ordinary man by science from the clutches of tradition. But often, science is in the hands of vested interests who send their 'demons' (Kolam), such as the police, against the common man.

The programme concluded with a musicial about the 'Cosmic Man' who seeks knowledge from around him and across space. In the finale of the song, the participants marched out with the flag of the Parishat on which the symbol of the Cosmic Man was emblemised.

II

CONVENTION OF PEOPLE'S SCIENCE MOVEMENTS

TWENTY YEARS OF KSSP

The KSSP is entering its 21st year of service. We would like to utilise this occasion to take stock of our working in terms of our failures and problems as well as achievements and potentialities. We are often asked by friends from outside:

1 In what sense KSSP is a 'people's science movement' in Kerala?
2 What is the 'secret' of the success of the KSSP?
3 How are the finances raised for its activities?
4 What is its relationship with other mass movements and organisations?
5 What is the impact of KSSP on Kerala society?
6 Is it unique to Kerala?

Perhaps it is too presumptuous on our part to describe KSSP as a people's science movement. But we do it because that is what we are striving for. We realise that without a scientific understanding of the society on the part of the people, real social change to create a better society will remain a distant dream. We believe that 'science' understood in its broadest sense, could be used as an effective tool in this process of social transformation. It is with this rather ambitious goal that we have evolved our programmes and policies over the last twenty years. This has forced us to be in constant interaction with a large number of students in schools and colleges and, through them, their parents. The other section of the population with whom we have initiated a continuing dialogue is the rural people. Dissemination of information, books and our magazine *Grama Sastram* and organisation of study classes have been the major forms of our contact. But in recent times the character of our interaction has been undergoing significant changes. The

---

Abridged version of the speech delivered by Sri. C G Santhakumar, President, Kerala Sastra Sahitya, Parishat on the occasion of the Inaugural Function of the All India Convention of People's Science Movements held in Trivandrum on February 9, 1983.

recent one has been our *Sastra Kala Jathas*, the third of which was concluded in November 1982. These *Kala Jathas* are conducted for 37 days from October 2 to November 7 every year travelling nearly 6,000 kms and visiting about 400 centres. The use of folk arts as an effective medium for presentation of themes such as corruption, environmental degradation, criticism of educational system, the state of affairs in our health and transport services and socio-economic history of the society, coupled with the novelty in presentation, has impressed a large section of the population. It has also helped, in its own way, to raise and often sharpen the level of social criticism. Apart from such mass contact programmes, we have been concentrating on a section of the population who are usually not found to be enthusiastic in social activism. We refer to the intellectual and professional community. One factor in our strength is the fact that a large number of such persons are actively associated with us rendering much valuable help in our publications, study, research and mass contact programmes.

It is this strength arising from the continuous contact with diverse section of our people that has prompted us to use the term 'People's Science Movement' though we do realise that it is only a begining and that we have to go a long way in fully justifying the term.

Frankly, we are unable to answer the question as to the 'success' of our efforts. We can only say that there are certain features of our organisation which make us different from others. The fiirst and foremost is that our activists do not get anything in return except the satisfaction they derive from doing such work as they find relevant. All the work is performed purely on a voluntary basis. This itself acts as a kind of 'screening'. Secondly, everyone has a role to paly. In assigning responsibilities, we do so only on the basis of what he or she can best contribute, given his or her knowledge, experience and ability. Above all, what we are striving at is to create a fraternity throughout the State, based on common interests, organisational commitment and at the same time mutual affection and friendship.

The voluntary nature refers to only the labour of our activists. All the other expenses are met from the receipts from the sale of our publications. Publishing is a very competitive

and commercial enterprise. Our success does not lie in competing with the commercial publishers but in creating a new field of publications which was the primary provocation for the formation of the KSSP itself.

Several friends have asked us about our relationship with other mass movements and organisations such as political parties and trade unions. We do not, and cannot, claim that we are apolitical. Since the questions we raise and the problems we take up have long-term implications for the development of our society, we do have an ideology. And that ideology, understood in the sense of enhancing the power of the people to understand and analyse social issues in a scientific manner, is summarised in our slogan: Science for Social Revolution. We want to arrest the trend of alienating science and technology from the reach and comprehension of the masses. It is with this aim in mind that we look upon other mass movements and organisations. We want to have interaction with them so that the long-term interests of our society are not sacrificed for short-term political or other gains. The nature and quality of public discussions on issues of vital concern should be such that people should not be made to depend on a few 'masters', however well meaning and erudite they are. There have been occasions when we had to oppose the policies of political parties when we thought that they have not sufficiently taken into account the long-term implications of their stand. The debate on Silent Valley is a classic example. But there are many more. Our latest stand on the education system and the debate we are trying to initiate, in all likelihood, may not be welcomed by many organisations. But we think that there is a dire necessity to create a situation where we should be able to think and act above sectional interests.

What I want to stress is that we feel that we have a role to play at this juncture but we do not want to give an impression that we are above other mass movements or organisations in the sense of a 'super-movement'. The impact of the movement should be judged not by us but by the people themselves. We can only say that we have been able to shatter the myth, to some extent at least, that decisions on issues involving a knowledge of science and technology are the prerogative of a few whether they be the technocracy or the bureaucracy in the system. Today in Kerala problems of pollution, deforestation, electricity

generation, health care delivery etc. are no longer subjects being discussed at closed conferences, seminars and academic and official corridors. They are being discussed and debated everywhere, in schools, colleges, villages, bus stands, in streets and in trains and at home; in fact wherever people meet for any purpose. We think that this is the first step in raising the level of social criticism for generating informed discussions and debates on issues in which the people have a stake.

Our achievements have not made us blind to some of the drawbacks and even failures. One of the major drawbacks of our organisation, which has been pointed out to us by friends from outside, is the very small number of women activists. Given the mode of functioning, especially during holidays and evenings, it has been difficult for us to get the active participation of women even if they would like to join us. But we know that excuses will not do and that we have to overcome these drawbacks.

Failure is something closely related to one's goal. In certain situations we have found our capability, both intellectual and organisational, put to test. We have not been able to respond in a meaningful way to situations created by, say, the recent 'liquor tragedy' in Vypin near Cochin or the situation created by the proposal to construct irrigation projects involving shifting of local people and their residences. It was more difficult for us to respond immediately to the recent looting and arson by communal forces. Organisationally, we do not have sufficient manpower to respond to various requests involving detailed study of, say, pollution problems in various rivers, incidents of organised and large-scale deforestation and similar cases where people now expect our intervention. In a sense, it presents itself as a dilemma for us in terms of the necessity to respond to immediate situations and our orientation to deal with issues of long-term implications.

It is quite tempting to say, as many have done, that the KSSP experiment is unique to Kerala, given its high level of literacy, political activism and the popularity of the printed media. I am not trying to discount these favourable factors but, I think they cannot, by themselves, explain the spread of our movement. To say so will also, *albeit indirectly*, imply that the absence of these factors are sufficient to preclude similar

attempts elsewhere. Our contact with fellow-groups in other parts, especially in Maharashtra and West Bengal, shows that it is really possible to initiate attempts of this kind though not in the same way or same style. That is not necessary also. The most important factor, in our view, is the readiness of groups and individuals to come together under a common platform so that they act as catalytic agents rather than promoters. To sensitise such individuals and groups, especially among the intelligentsia, through the use of 'science' medium, is the most important and challenging task today.

In what ways and through which 'entry points' we can go about in this task, I hope this Convention will deliberate and come out with some practical suggestions.

SCIENCE AND DEVELOPMENT

M. G. K. MENON

I am very happy to be here this morning with you because I believe very strongly that it is vital and of the greatest importance for our country to have science developed at the grass roots level. And I believe that for this it is important to have what you will be discussing here in this particular convention, namely, People's Science Movement.

Let me place before you only a few basic features that I regard are the elements of the scenario that we have before us. First, I would like to make a statement that the world that we see around us today is basically a world which is a product of the developments in science and technology. I think there can be no ambiguity about this. This is not to minimise anything else that has been done. The fact remains that for quite sometime now there has been an exponential growth in everything in the system. If one speaks over the loud speaker system, one has fans operating, if there are cars, if there are wide-bodied jets in which people travel so extensively all over the world carrying 400 persons at least; all these are due to the developments in science and technology. If you take all the miracles of modern electronics, the whole field of atomic energy, the space programmes of satellites, the probing into the very fundamental aspects of matter upto extremely small dimensions in atomic physics and particle physics, probing into the mysteries of the universe, you can see discoveries over the past 30 years of a magnitude enormously larger than anything which has taken place before upto the origins of the universe. The probing into the very nature of life, into understanding life at the molecular and cellular level, the genetic code structure of DNA and all what is opened up...I don't want to say much more. Our understanding today of

---

Inaugural Address at the All India Convention of People's Science Movements at Trivandrum on February 9, 1983.

nature, extent of knowledge, the techniques that are being developed, and what has emerged from it in terms of products and processes that affect our daily life characterise the world today as a world of science and technology.

Second I would like to say that today there is a symbiotic relationship between science and technology. In the old days some could have said that there were crafts which developed in their own way; one did not even explore the scientific reason for the development of these capabilities. The industrial revolution was a product of people who worked with their hands that way. But today that is no longer the situation. The fact is that scientific discoveries are being converted into technology, and technologies are important for scientific advance. There is a very close symbiotic relationship between these. You can take almost any area. Take the field of lasers, for example. The scientific predictions relating to it were due to Einstein. The actual work of micro-wave amplification, later light amplification was 25 years ago. Thereafter you can see today, lasers are used by doctors for treating patients; they are used by surveyors for straight forward survey measurement. They are used in industries for cutting, they are used in electronics industry, they are used in all scientific research today. So there is the symbiotic relationship.

Third point I like to make is that we are not going back. This is human knowledge, human understanding, a part of human ethos today.

Now I would like to come to a completely different aspect namely, the whole question of how science did develop. You know science has had many a historical start. There have been great discoveries in our country in mathematics, in astronomy, in metallurgy, in chemistry and so on. But science and technology in the form we know it today, this exponential growth rate, this symbiotic relationship is somthing relatively new in human society. We have science in India, in China in Greece, in Rome, in West Asia, in Europe. But what we face today, what we have today is something quite different and that is essentially based on the relationship between experiment and theory. It is not purely a question of philosophical discoveries. It is a matter of actually observing phenomena. measuring parameters with degrees of accuracy, making

analysis and hyphotheses and theories on that and testing them with more experiment. Therefore there is also the symbiotic relationship between experiment and theory. It is very clear that there was a conflict between society which is conservative, which is static, which has authoritarianism and those who question, and questioned on the basis of observation and measurement. It is this questioning which is characterisitc of science. What do we see in India today? What is the basic characteristic of our society? What we see here in our society still is something which need to be transformed. Take the field of education and employment, I personally believe that we have in our educational system the very strong tradition of regarding education as transmission of information. That is why everybody memorises. We have in a sense a Brahminical tradition in which you sit, you read and you learn but you do not do this in terms of experimental approaches which I said is the characteristic of science. We have a colonial factor in it which one feels because during the colonial period the centre of colonial power was the bureaucracy. We see therefore our people wanting essentially to do such jobs which may be called white-collar jobs. A girl would prefer to be a typist or clerk or a nurse. A man would prefer to be a clerk or typist, not an artist, carpenter, welder, fitter, or a mechanic.

We today have a very large number of scientists and engineers, regarded as the third largest manpower in the world. But we have to ask ourselves: is this really science at grass roots in the country? The answer is: No. It is a professional activity in itself. Just as much as you have qualified medical doctors you have qualified scientists who are carrying out a set of tasks. But this by itself is not going to bring about national development. Jawaharlal Nehru once said and I quote what he said.

> "Science in not a matter of merely looking at a test tube and mixing this and that and producing big and small. Science ultimately is a way of training the mind and the whole-life functioning according to the ways and methods of science".

He also said in another context that science must think in terms of a few hundred million persons in India and this could not come about through just the efforts of a few people functioning at the scientific community or at the professional group.

But it must come about through work at the grass roots level. The point I would like to get back to is that large parts our of educational system really consists of transmission of information, of knowledge. That is way this aspect of trying to learn by rote, memorising, passing examinations, which are all written examinations. It is so traditional. On the other hand, what one really wants in science is the whole process of logical reasoning. It is not a question of information. For the masses of the country language is a handicap because it is alien. On top of that one is trying to express and understand ideas which are complex in their own right. Once I was arguing with a group of friends that one does not have to define anything, one does not have to learn science or English with all the jargon; it is possible to do this entirely with personal interaction with the environment. This happened when I was in the rural side of the country along with a group of friends. We were seated near a small tree where a river was flowing. I said we would try an experiment here and it essentially consisted of a large number of boys around 10–15 years in age who were grazing cattle around. So we called them and said we would do an experiment without speaking a word of English. We asked them to do a certain experiment. We asked them to collect water from the river in the *lotas* which they had. Water was collected essentially from three places. Nearby there was a village and there was a dhobi-garh where some people were washing cloths. We asked them to collect water upstream before it reached the village area, near the dhobigarh and after it passed the place where dyers were doing their job. So they went up to collect water. So we had water. First question: does it look different? One looked clean, one soapy and one looked coloured. Can we get rid of these things? So they started filtering with their turban cloth. You know they found that they could clean the water in terms of grass and other things in the upstream. They could get rid of a lot of the soap stuff etc. They could not get rid of the colour. So they discovered what they could do through filtration. We asked them whether it is dangerous; they did not know. One of them had a bright idea. He said something might die if it was dangerous. So I asked what would die if there is any colour in the river. They brought small fishes and so on. After a while they discovered that all those fishes which they had put in the *lotas* which had

the dye water were dead in one hour. But the fishes in other galsses were all alive.

I am only citing these things as illustrations. Today one talks about environment, about pollution, about toxic aspects. Not one word had to be used. It was entirely a matter of doing a set of experiments. They collected water, they observed the colour, they tried to filter it and find out whether it was toxic or not. You can proceed through this and teach them about all these things without a word of English, without a single definition or jargon used in it. At the same time they learned what is the most important element of science, doing experiments, using their hands, observing, drawing conclusions from it and then you can go through the next set of testing. I give this illustration purely to point out that this is what is totally missing in our educational system. One learns everything by the authority of the book, by the authority of the teacher, by what people say. Now this is the structure which one encounters and how does one change this? I think it is absolutey essential that we do as much as possible to get down to the people at the grass roots. Some of it could be done through the educational system. It must be transformed. But above all what it really required is to take it to the people at large because in this not only are those who formally go to school but those who have come out of it. We tend to forget that education is a continuing process. If one talks about education which is living and which all the time has to be renewed it is an attitude and approach. There is new knowledge, there is new understanding, this essentially implies the continuing process and this can only come about through the equivalent of the movement that you characterise.

I like to give a very different example, that is from the field of health. We regard health as one of the great priorities in national development. We are spending a very large sum of money but we focus mainly on the aspect which one could call curative. We have even forgotten the holistic approach to health which is characteristic, for instance in Kerala itself, in Ayurveda, which is maintenance of health. One, for instance, talks today of a variety of areas in health in terms of medicine to be given when some body is ill. But, on the other hand, a very large part of the problem of health in this country stems from population explosion, malnutrition, due to insanitary conditions, particularly

water supply. There we have very little to do with exotic, sophisticated complex areas of medicine; very little to do with expensive drugs and medical facilities. And yet this is something which can bring about health on a very significant scale, reduce the requirements for curative aspect, reduces a lot of burden on the economic system. Now this is only one example but it is obvious to you that, since you are working at the grass roots level how critical and important is this. A large part of our infantile mortality arises out of insanitary conditions and malnutrition arising out of dehydration particularly due to dysentry and diorreah. They can be reduced and prevented to a great extent. This comes about through understanding and not necessarily by schooling. So it is very clear that one has to build up the whole area of science and society, taking science to society at large, what it means. Of course, some of it would be information on the world, what is happening in the would, what is happening in the country, but a large part of it will be the scientific approach based on logical reasoning, relationship, experiment and theory, on questioning and observing, not accepting authority just because someone is in a higher position, in any sense of the word, due to religion, due to bureaucracy, politics or age.

I am very happy to be here because what you are trying to do will be what is required by this country in a very significant way if development is to take place. I hope that you will proceed with vigour and I think it can only come about through voluntary effort, such is characteristic of your efforts, on the basis of enthusiastic, dedicated and committed people who believe in what they are doing and not doing it just because they are asked to do. I am very happy to inaugurate this Convetion and wish you very great success.

SOCIAL SCIENTISTS AND SOCIAL REVOLUTION

K. N. RAJ

It is in my capacity as a social scientist, I presume, that I have been extended the honour of presiding over the inauguration of this All India Convention of People's Science Movements and invited to deliver an address on this occasion. Professor M. G. K. Menon, one of the most distinguished physicists of our country associated with the Tata Institute of Fundamental Research, now working within the government to promote and execute the many mundane things that need to be done at that level in the deepest interests of science and technology among our peole, has already done us the honour of inaugurating the Convention. We have now many important matters to discuss, and I do not therefore wish to waste your time speaking at length on issues that do not need to be touched upon. However, I have a few things to say as a social scientist, and I shall do so very briefly.

It is customary to say that science is *one* and that the practitioners of both the natural and social sciences must interact with each other and work closely together. But in practice there is very little evidence of it even now in India. I know from my limited but nevertheless inspiring association with the Kerala Sastra Sahitya Parishat that this is one of the few organisations in which there has been an earnest and active effort to bring the natural and social scientists together. The Parishat not only persuades them to work together but above all to get to know first-hand, by getting directly involved in field activities of all kinds, the innumerable problems that now torment millions in our rural areas; understand how the people themselves view these problems; establish mutual communication in all possible

---

Presidential Address at the All India Convention of People's Science Movements at Trivandrum on February 9, 1983

ways; and thus get both emotionally and intellectually involved, in as full partnership as possible with the people, in the search for both temporary and long-term solutions to their problems.

We in the Centre for Development Studies at Trivandrum have been very much a target of the Parishat's attention and favours; and I think I would be speaking for my colleagues in the Centre when I say that we are grateful to the Parishat for its frequent reminder to us not to retreat into another ivory tower. Indeed it was our privilege to arrange the first All India Convention of People's Science Movement in our Centre in 1978. If we could not offer to host the convention this time, it is mainly because larger numbers are involved and we do not have adequate facilities. Nevertheless all of us from the Centre, representing in a way, the social sciences, feel privileged to continue to be associated with it in one way or another.

Here today we have amongst us not only the representatives of the Kerala Sastra Sahitya Parishat but delegates from many other such organizations distributed all over the country. They are not all of the same mould; in fact, it is because they differ in many respects, differing perhaps not only in the things they try to do but in the approach they adopt and the methods they use, that they have been invited here for intensive discussion on matters of mutual interest. We are all therefore hoping to learn a great deal from this convention.

Yet, even though all the organizations participating in this convention are not quite of the same mould, there are probably one or two important features in common. One of them is of course the acceptance of a rational, democratic, and scientific approach to the problems of our people, as distinguishable from an obscurantist, authoritarian or merely populist approach. In other words, the involvement with the masses is not intended to encourage the superstitions, the subservience, and the credulity of the vast — fostered over centuries in this age-old civilization of ours — but rather the opposite. It is to introduce an attitude of rational questioning; to find solutions to problems on the basis of careful study and dissemination of facts; to promote wider awareness on this basis of the strength and power that can come from collective action based on such a scientific approach; and of course to prevent the poor people being exploited, cheated and deceived in various ways, as is now being done on

an unprecedented scale in our country.

This leads me to what is probably the second common feature. It is a considerable disappointment with the record of existing political organisations in our country irrespective of their label; some disillusionment and distrust with *all* existing political parties, though no doubt to varying degrees; a clear recognition nevertheless that ultimately no adequate solutions can be found for the basic problems of our people without identifying very clearly the deep-rooted social and economic conflicts that are inter-twined with political processes; and that therefore, while it may seem important now not to get too closely involved with existing political parties, but try and plough an independent furrow, there should not be any fear in raising and facing issues of a political nature as well, regardless of the risks involved in such a course.

The approach is of course not anything new in our country, for that is the way Mahatma Gandhi showed us through his own personal example. I need hardly recall how, while he led the national movement, he declined to be even "a four-anna member" of the Congress party (for reasons we can now see so much better); how cleary he recognized the deep-rooted nature of our social, political and economic problems; how therefore even while stressing the need to achieve political independence (which perhaps he did not then expect to realize so quickly), he emphasized the importance of combining the political struggle with a programme of economic and social reconstruction based on vitally important ideas such as removal of untouchability, extension of adult education and basic education among people on the largest possible scale, reliance on indigenous technology to begin with (with improvements introduced later to the exent found economically and socially feasible at each stage), and the introduction of democratic institutions at the local level through panchayats. None of us can of course pretend to have his insights or his skills, but we can, I think, follow in his footsteps, conscious of the tradition we drew inspiration from. We need therefore only adopt the same approach, taking into account all that we have been able to learn from further experience in our country as will as in the rest of the world, and adapting both the ends and the means to the requirements of the contemporary world and the problems India faces now.

This does of course pose many problems, particularly for social scientists and for political activists, as it raises several issues for which there are no clear-cut answers, and for at least some of which each one has to find an acceptable solution satisfying above all one's own individual conscience. Some of these problems are particularly serious for social scientists, as the methodology they are compelled to rely upon by the nature of the phenomena they are concerned with makes it much more difficult to test and prove their inferences beyond dispute than in the case of the natural sciences. It would be therefore much easier to label them as "politicians", "diplomats", "opportunists", "frauds", and worse unless they are indeed very careful.

What is the solution for this very difficult problem? I am afraid there is none that is completely fool-proof because, as I just mentioned, it is in the nature of both the phenomena the social scientists are dealing with and the methodology (of whichever vareity) they choose to adopt. Personally, as an economist who is convinced about the superiority of 'political economy' over what is often described as 'pure economics' for dealing with the problems of social, economic and political transformation, and practises it without feeling the need to offer any apologies, I have found that there are only two norms one can try and adhere to in order to preserve one's professional integrity as far as possible consistently with one's beliefs (which would necessarily include one's values and ideological biases). First, one may make clear whatever are one's beliefs to the extent necessary in each context; second, all relevant facts should be studied carefully, none suppressed or distorted consciously, before inferences of any kind are drawn.

In a very important contribution on this subject about three years ago, professor Amartya Sen (of the University of Oxford), who is both a distinguished social scientist and a social philosopher, had observed that, while economists have been so far largely focussing their attention on "prescription" and "prediction", they have neglected to a large extent the important role of "description". It is this very important gap that we economists, and perhaps social scientists in general, need to fill through painstaking and conscientious empirical analysis. From this point of view, direct involvement with organizations and

movements of the kind represented here in this convention can only help. One must of course keep in mind all the time the extremely onerous social responsibilily that social scientists bear in having to be particularty careful to draw only such inference for policy purposes or otherwise, as are consistent with the entire range of knowledge available on the subject, either from existing literature or from field experience, in each case, and not rush to conclusions on the basis of casual empiricism. No doubt social scientists who are emotionally and intellectually committed to radical social transformation should also remember a dictum of Professor Joan Robinson (of the University of Cambridge): "honesty and hard work are required of radicals, while the orthodox can doze over their dogmas"!

However, even with the best of intentions and with all the care one may take, it is still possible to make mistakes or be misunderstood for any reason whatsoever. This is a professional hazard that has to be faced, and resolved as best as possible through intellectual modesty and honesty. The seriousness of the dangers that social scientists (or philosophers) could nevertheless be exposing themselves to is illustrated best by the earlier history of a famous observation attributed to Karl Marx, that "religion is the opium of the people". What he had in fact written was something quite different. So let me indicate fully the context in which he made it and the extent of the injustice done to him by subsequent "Marxists".

It was in an introduction to a philosophical tract criticizing Hegel's *Philosophy of Right*, published in 1844, and his two closely inter-related observations were the following:

> "Religious suffering is at the same time an expression of real suffering and a protest against real suffering. Religion is the sigh of the oppressed creature, the heart of a heartless world, and the soul of a soulless state of affairs. It is the opium of the people".

As can be easily seen it was a very profound insight indeed, one that might not only have been acceptable to many highly religious persons like Gandhiji but offers some clues to why there is now a revival of religion in even socialist countries built up with a different orientation. Unfortunately, Lenin chose to

quote just one part of the whole observation in the course of his political activities early in the 20th century; and, since very few "Marxists" care to read Marx but are content with various versions of "Marxism-Leninism" in capsule form, it is the wrong version that has been in circulation for a very long time now. The damage caused thereby has been so pervasive, and so much affected the psychological attitude of many people to anything that Marx's name is associated with, that it has affected even the Kerala Sastra Sahitya Parishat whose constructive activities were at one stage described in some highly conservative bureaucratic circles in this State as "anti-religious"!

Let me take this opportunity to say a little more on this aspect of the role of the social sciences and the hazards to which a social scientist is exposed to, because they are among the most serious obstacles to the fuller and more enthusiastic participation of many earnest individuals in movements such as the Kerala Sastra Sahitya Parishat. Personally I regard Marx as the most creative social scientist of at least the last hundred years, and would have therefore no hesitation in calling myself a Marxian in the same sense as I might in another context be content to accept the label of Keynesian; if I do not do so, it is only because Marx has been now made the private property of certain political groups who presume to interpret him and would be very upset by what they would consider my audacity or hypocrisy. Some persons have even assumed the role of priests, reserving to themselves the right to decide who are the true believers and who are not, and to ask inquisitorial questions to which answers are supposed to be given in the form of "yes" or "no".

For instance, when I drew attention recently (on the occasion of the Silver Jubilee celebration of the Kerala State Legislature), to some of the inadequacies of the policies followed by coalition governments in Kerala over the last decade and a half, and to the fact that agricultural growth in Kerala was zero over the last decade despite the land reforms here being much more effectively implemented than elsewhere in India, a highly respected political leader here thought it necessary to devote a whole article (in his party newspaper) charging me with pretensions to be an objective scholar. To settle the matter once and for all, he wanted me to answer one simple question, whether I was now with the Left Democratic Front or the United

212 HEALTH CE... HEALTH CE... 1st Floor, St. ... Bang...

Democratic Front in Kerala! There is now going on a violent political controversy as to which of these two Fronts is responsible for the serious financial problems the State is now facing; perhaps some of us will soon be confronted with the same kind of question, and asked to make our individual positions clear, ignoring of course the simple fact that the Finance Minister has been the same person right through and that, even though he has moved from one Front to the other, it is he who should be able to offer an appropriate explanation.

Let me not appear to be picking any particular spectrum of political parties or organizations in the country for adverse comments of this kind, because in fact whatever criticisms I feel compelled to make on this account apply to all political parties in the country in varying degrees. In fact, Mahatma Gandhi has also been made the private property of some parties and organisations, and their spokesmen often speak as if it is their right to decide what constitutes Gandhianism, though many of them have even less justification to make this claim and are in many ways complete counterfeits (with convictions closer to those of Nathuram Godse than Mahatma Gandhi).

In my view, what we need today in India (and perhaps also elsewhere in the world) is a discriminating blend of the ideas of both Karl Marx and Mahatma Gandhi, without raising either of them to the status of gods; feeling therefore free to be critical of either's views whenever subsequent experience clearly demonstrates the need to question them, but recognizing at the same time their continuing relevance to all the problems we face. More specifically, this would mean recognizing not only the economic and material basis of social conflicts and exploitation but also the dangers involved in concentrating power in any form or for whatever reason and introducing important moral dimensions as well as democratic values in the methods adopted for resolving conflicts arising therefrom.

I have taken the liberty of mentioning all this here because I think the time has come to make clear what are the larger social obligations of scientists as a whole, particularly of social scientists, and to whom. I have placed my own views before you very frankly and without any inhibition. I am also clear in my mind that the obligation of both natural and social scientists is ultimately to the people in the widest sense of the term, not

to any regime or political party; and that, even if they happen to be affiliated to one or the other (certainly there is no particular virtue in being totally non-aligned and neutral, since that may reflect and generate indifference to one's environment and fellow beings), they cannot afford to forget their larger social obligations without forfeiting also their right to be regarded as citizens of the world (perhaps even as scientists in the broader humanistic sense).

I am sorry to have inflicted on you a much longer address than I had originally intended. All I can say in defence and by way of apology is that it has helped me to unload from my mind and heart some of the problems that have been worrying me intensely over the last few years. I hope you will find them to be of some relevance to the many issues you will be preoccupied with in this convention, and also to the wider problems facing the country now; and that, even if there are good reasons for not being able to accept some of the propositions I have advanced, they will help to generate a healthy and vigorous debate that leads to greater clarity for us all. Above all I trust that no one, among either scientists or political leaders and activists, will feel insulted or unhappy by anything I have said; that would be quite contrary to my intention and stifle open expression and exchange of views of the kind we need now in facing the serious crises in which India (and the world as a whole) may soon be engulfed.

TOWARDS A PEOPLE'S SCIENCE MOVEMENT: A REPORT

ANWAR JAFFRY, MAHESH RANGARAJAN
B. EKBAL, K. P. KANNAN

A large number of groups, mostly on a voluntary basis, are working in India in areas which may be said to fall on the interface of science and society. Some are engaged in focussing attention on the unscientific attitudes and policies towards such basic issues as health; some are engaged in highlighting the adverse impact of development activities as a result of inadequate and often wrong application of science and technology in the field of environment; a few are engaged in demonstrating innovative and interesting ways of teaching science while quite a number are engaged in development activities in the areas of health, nonformal education, appropriate technology, housing, etc. based on their scientific knowledge. Apart from such specific activities, attempts are also under way, as in Kerala, to develope a People's Science Movement (PSM for short) fusing the numerous activities listed above with the help of the spoken and the printed word as well as the various art forms of the people. The underlying motive for such a PSM has arisen from the need to enhance the people's capability to understand and analyse social issues in a scientific framework. It is the use of science, in one way or the other, in the activities of these various groups which has created a common thread bringing them together under the banner of PSM.

A Convention of such People's Science Movements was held for the first time in India in November 1978 in Trivandrum under the auspices of the Kerala Sastra Sahitya Parishat. Partly as a result of that Convention and partly as a response to the challenges in several local situations a concerted attempt was being made to move towards a People's Science Movement in India. Mention should be made of the formation of Lok Vidnyan Sanghatana in Maharashtra by a number of groups,

Karnataka Rajya Vigyan Parishat in Karnataka and the recent attempts at coordinating various science-based groups in West Bengal. At the same time initatives of individual groups have also been increasing both in the range and depth of activities. The Samudaya group in Karnataka has been quite successful in establishing a communication link with the people particularly in rural areas through the medium of art, the Uttarakhand Sangharsh Vahini in Garwal in northern UP has been forging ahead not only against deforestation but in educating the people on the relationship between their economy and ecology and mobilising the youth in conducting such activities as establishing local communication through their own newspaper, use of art as a powerful weapon for mobilisation and channelling people's energy, and regional level resarch studies.

In the light of these experiences it was felt that a second Convention of PSM should be held so that an attempt could be made to weave the varied experience into a common all India perspective. The KSSP which has been functioning in Kerala for the last twenty years and has been developing, for the last ten years, as a PSM in the State hosted the second Convention also to coincide with its completion of 20 years. A list of participants in the Convention is given in Appendix.

The concern of the Convention focussed on the need to define PSM which should then form the basis for an all India perspective so that programmes and activities are initiated in such a manner as to have a clear cut direction and purpose. It became clear through the exchange of experiences and various formal and informal discussions that in the present day situation the country is caught up between two forces both of which could be identified as antiprogress and anti-science. One was the social oppression of the vast majority through force and, indirectly, through caste, community and religion. In the absence of an organised attempt at emancipating the poor from the socio-cultural oppression, godmen, superstitions and their ilk have a field day. While these forces tend to pull down the emancipatory potential and zeal of the vast majority of the people, there are also tendencies to oppose and overcome these forces. But a much more direct threat to the economic well-being of the people come from both official and non-official programmes and policies of 'development'. It is here that science and

technology is being consciously used in the name of progress, modernisation, development, etc. However, given the 'progress' so far achieved it is not difficult to see that science is being used as a convenient tool to manipulate and confuse the people so that the capitalist development which is impoverishing the majority while enriching the few is carried on without organised opposition. Moreover, science and technology has been getting alienated from the people, their understanding and knowledge, life experiences and problems. Instead of helping the poor, science and technology has been increasingly becoming an oppressive instrument.

It is this awareness that has led many a section of the educated and socially conscious youth to turn to social activism based on science. In trying to base their activities on scientific knowledge a "space" has been carved out which is different from the kind of activites undertaken either by political parties, trade unions or similar mass organizations. Given the experience and capability of existing groups, four areas were identified for future programme of action as a basis for initiating a PSM in the country. These were: (i) health, (ii) education (iii) environment and (iv) use of art as a medium of communication with the people. A few common programmes were chalked out after extensive discussions on each of these subjects so that joint action could be initiated throughout the country. A brief summary of these discussions is given below.

On Health

Evolving a people's health movement should form one of the most important elements of a People's Science Movement, this was the unanimous opinion of all the groups. There was general agreement on the critique of the present health delivery system and the need for an alternative people-oriented approach. Health and health problems can be understood, it was noted, only when they are seen within their social and cultural context at different periods of time. The dominant approach to medical problems which prevail in the industrialised countries is clinical or curative. They have formulated a highly centralised, sophisticated and mechanical health delivery system. Such an approach whose relevance is being questioned even in the industrialised countries is being fostered in our country as the ideal one. This has meant

that instead of taking care of the social dimensions of health problems, developing a people oriented service and moulding medical technology to the needs of the people, the health sector under the banner of welfare services has become a supportive structure for profit making ventures. 'Health' is now a commodity for sale.

The lack of non-medical facilities like housing, food, shelter and clean water has further complicated the problem. While it is true that the number of health service institutions, doctors and specialists have been increased, the actual distribution has an urban and curative bias. The expansion of service has been mostly due to an increase in the curative services at the expense of preventive services. Preventive works have suffered further set back due to lack of provision of the basic amenities like food, clean water, housing clothing and employment.

The objective necessity of joint action at the all India level, the possibility of involving non-professionals in such action programmes and the availability of resources and manpower for implementation were considered. A campaign on ban of certain drugs, on anaemia in women and an anti-diarrhoeal campaign were considered as having tremendous potential for initiating an All India Movement within this outlook.

The multinational companies dominating the field of drug manufacture and distribution are following unethical trade practices and marketing non-essential and dangerous drugs some of which are banned in other countries. At the same time the drug companies were not concerned with production of essential drugs necessary for the management of such diseases like tuberculosis, leprosy, etc, and medicines used for preventive work. As suggested by the Hathi Commission and WHO a list of esssential drugs relevant to our country and drugs which should be weeded out should be published. All available forums and methods of propaganda should be utilised on the drug issue to reverse the wrong policies of the government and the drug industry and to educate the public and also to sensitise the medical professionals.

Some of the specific issues as on the Estrogen Progesteron preparation should be taken up for immediate action. The EP preparations which are high dose combinations of Oestrogen and Progesteron used for a specific menstrual irregularity are being

sold for conditions other than their specific indication. It has now been scientifically proved that such high dose combinations can produce teratogenic effects on foetus and result in congenital malformations of the babies born subsequently. The drug companies have been successful in obtaining an interim injunction in Bombay and Calcutta High Courts on the Government ban of these drugs. It was strongly felt that the Government should be urged to effectively defend the issue in courts and not to surrender to the pressures of the drug manufacturers.

The Convention noted that the role of indigenous medicines as a possible alternative should be scientifically examined. A few on-going studies in this field were mentioned. But a conscious effort should be made to gather all available information on this matter which can be utilised as background knowledge for initiating a meaningful dialogue on this issue.

The anti-diarrhoeal compaign has already been taken up by some groups like the Medico Friend Circle. The irrationality of the anti-diarrhoeal drug combinations should be emphasised and people should, and can, be educated on such simple measures as Oral Rehydration Therapy for managing diarrhoea. Government should be pressurised to force the drug manufacturers to include a statutory statement in all anti-diarrhoeal preparations that ORT is the most effective method of diarrhoea control and treatment. The inter-relationship of diarrhoea and insanitory living conditions, lack of facilities for sewage disposal and above all malnutrition and poverty should be emphasised in such campaigns. This will give a good opportunity for exposing the drug industry, educating the people with a deprofessionalised approach on a severe health problem and conscientising the people on the socio-economic basis of their health problems.

That joint action on health problems specific to women should be taken up was generally felt as highly urgent. Campaign on anaemias in women is a major issue. Propaganda against the irrational anti-anaemic drugs, demand for better medical facilities during pregnancy, prophylactic measures against anaemias and the root cause of anemia as poverty and the poor socio-economic condition should be highlighted.

On Education

Discussions revealed that the most burning issue in the

field of education was the failure of the government to implement universal primary education (for a period of seven years). Participants felt that the question of universal education for the younger generation was closely linked to the need for adult education. Problems of high drop-outs exist mainly for first generation learners and it therefore becomes imperative to involve parents in the educational process for (i) making them conscious of the need for education and (ii) maintaining the functional literacy imparted to children by providing a suitable home environment.

What became clear at this point during the discussion was the total lack of interest or will in the ruling elite to implement educational reforms. The dynamics of reinforcement of such an attitude is obvious from the mushrooming of English medium private schools even in rural towns. Since more and more people with any 'say' in our society are sending their offsprings to these private schools their interest in the improvement or increase of government schools vanishes.

The issue of educational quality is closely connected to the lack of a rational government policy regarding expansion. For example, visiting political dignitaries with short term political gains in view, accede to demands for new schools, specially in rural areas, without a corresponding increase in the allocation of resources and personnel. As a result of this phenomenon, an increasing number of primary schools in our country function with very poor resources and an acute shortage of teachers. To sum up, the following reasons were considered to be the main impediments in the quality and quantity of primary education imparted: (i) shortage of schools in remote areas as well as in tribal and backward areas; (ii) poor facilities in the existing schools, e. g. shortage of teachers and educational materials, poor school environment etc; (iii) high drop out rates specially in the early school stage due to economic, cultural and linguistic problems as well as lack of relevance of curriculum to students' life; (iv) mushrooming of English medium private schools and the corresponding neglect of the existing government schools and (v) unplanned expansion of school network for political or populist considerations without a corresponding increase in their resources.

It was emphasised that a study of past efforts clearly shows

that the creation of a parallel education system by voluntary efforts is just not feasible. However, the active involvement of voluntary groups in the existing schools structures could produce very positive results as is shown by the experiences of Kishore Bharati and Eklavya groups working in Madhya Pradesh. The reason for this is that voluntary agencies have the necessary flexibility to experiment with educational innovations while governmental structures can provide the necessary means to disseminate such innovations on a macro-level.

However, for many participating groups it may not be possible in the forseeable future to actively intervene in the educational system except engage in a national level campaign focussing on the drawbacks of the existing system and articulating an alternative framework. Therefore, keeping this as a long term objective, it was decided to emphasise the need for activities aimed at increasing the involvement of teachers in popularising science as well as in discussing problems of education in general. Thus, depending on the potential of these groups the following activities were suggested as being useful in further work: (i) bringing out magazines for children to popularise science and literature as is done by groups like KSSP, (ii) organising community science centres with a library, workshop, audio-visual facilities and mobile exhibitions, (iii) use of art and theatre forms as catalytic media for dissemination of PSM ideas, and (iv) field study and surveys of the problems of education to base the initiative and understanding on more firm grounds.

In many States in the country, the printed word may have only limited value as majority of the population is illiterate. Hence the need to use audio-visual medium, particularly of people's arts, for non-formal education purposes. More on this was discussed under the last item on Art.

On Environment

Environmental problems can only be understood as an aspect of broader reality and not as an isolated element. A scientific analysis of totality of the interconnections between seemingly unrelated issues is the only viable basis for effective action. The various ecological problems in the country were viewed in this perspective. Soil erosion is eroding the agricultural

productivity of the land. Deforestation and the shifting cultivation of the hill slopes in river basins accelerate erosion of the soil. The lack of state assistance in levelling the land and taking up soil conservation work in an effective manner prevents the peasants from controlling erosion. Eroded land goes along with the lowering of the water table as the water, instead of partly percolating into the ground, flows into the streams.

Laws made by the government such as the proposed Forest Bill are the logical culmination of a historical process. The Forest Bill which gives extensive powers to forest officials encroaches on the right of the people such as tribals who depend on forests and facilitates the acceleration of the process of deforestation by commercial vested interests. It was agreed upon that the approach to be adopted would be not to draft a good bill or a good policy, but to expose the social reasons behind the present forest policy. While some felt that the issue of democratic rights of people need not be taken up actively by People's Science Movements, everybody agreed with the view that the issue of people's rights cannot really be separated from forest conservation issues. The manner in which the Forest Bill was circulated only in limited copies and the fact that no people's movements were ever associated at any stage during the drafting of the bill revealed that participation had no relation with decision making. The bill was withdrawn only after a sustained campaign and another bill is being drafted at present. The issue of the Forest Bill is a focal point for people's science movements. Not only can it enable them to assist people's struggles but it can enable to moiblise public opinion on a whole range of issues: social forestry, floods, wildlife, drought etc.

Development projects are carried out without attempting to analyse their impact on the environment. The only way in which decision makers can be made to take account of environmental problems is to create public pressure which can only be done through mass awareness. Working for specific isssues is important but such issues need to be used as an opportunity to increase consciousness and take it to a higher level. Issues such as the Silent Valley, Chaliar pollution, deforestation in Uttarkhand (Chipko) were cases in point.

Several problems need to be faced, especially that of short-term interests and long-term interests. The Lok Vidnyan Sangathana reported the case of the Bhim river project where water logging threatens fertile black cotton soil land but the authorities refuse to accede to demands of mass organisations that the cultivators be helped in water management. In the case of Silent Valley in Kerala, the local people did not join the agitation against the project since they only saw the short-term economic benefits such as employment. Though long-term needs such as conservation of rain forests do matter, do such 'totality' approaches have relevance for the people at large? Alternatives to the project have been suggested but what if they are not taken up by the government? The movement against pollution of Chaliyar river in Calicut by Gwalior Rayons effectively united local people against polluters which had not been possible in the case of Silent Valley.

Examining the experience of the famous Chipko Andolan of Uttarakhand several crucial points emerged. The projection of the movement by the media made people view it in isolation from the ecological conditions of the region, the nature of the movement and the social situation that engendered the Andolan The specific social conditions of the region such as the low level of industrial development, the high rate of unemployment, the large-scale migration of men to the plains creating the money order economy, the hardships faced by the women due to deforestation etc influenced the direction of the Chipko Andolan.The real enemy of the forests was not the forester or contractor: they are only a symbol of commercialization of forest resources. The change of parties at the State and national level did not essentially change the direction of policy. While deforestation was begun in Uttarakhand by the British, it further accelerated after independence. The 1970's found students and poor women play an important role in the movement. Differing approaches within the movement were identified: some saw the forest issue as part of broader social problems while others wanted the issue of forests to remain in focus. Though deforestation does affect the plains as it accentuates floods, it is the people of the region who need to be mobilised on a priority basis. The use of traditional cultural media for mass awakening was important. The response of the State to the movement has been (a) to express

concern about forests but continue deforestation, (b) take limited steps such as replacement of contractors by the biggest contractor, the Forest Development Corporation, (c) repression of the movement and (d) co-option of a few leaders by building up their image, giving them awards and dividing the movement.

A broad consensus emerged from the discussion on environment.

They are:

(a) Vested interests benefiting from environmental degradation are actively assisted by the State.

(b) Science is not value-neutral but used to assist the vested interests. For instance, forestry science is used to justify deforestation by forest departments.

(c) People's science movements must base their views on scientific analysis of problems and of 'vested interests' in science.

(d) Conservation of the environment is not possible unless people's struggles are channelled to counter the policies of the State and the power of the vested interests.

On the basis of the consensus, it was agreed that joint action be initiated at the national level on (a) breaking the communication gap between people's science movements, informing each other about problems faced, tactics used and problems encountered, (b) circulating policy studies such as the critique of the Forest Bill and studies on occupational safety, for wider dissemination, (c) exchanging visits whenever possible, (d) producing slides and such other materials for exchange and dissemination, and (e) forging a united front against the Forest Bill.

On Art

Given the experience of many groups on using art as a medium of communication with the people, a great deal of discussion took place on the theme. Uttarakhand Sangharsh Vahini (from Garhwal, UP) had been using art in their various struggles first against deforestation and similar issues but now to embrace all aspects of people's struggles. Out of such struggles, songs, poems and plays were evolved and these forms have demonstrated their power in unifying the people's experiences and sentiments.

SAMUDAYA from Karnataka is a group of artists exclusively committed to the use of art in progressive social transformation. The ideological and social commitment of its members was the unifying force. In its attempt to portray political and social issues, it has evolved and adapted a number of techniques using the human body without any stagecraft. Open street performances and simplicity of presentation without however sacrificing the sharpness of the thematic content were the hallmark of SAMUDAYA's performances. SAMUDAYA members started touring the State from 1979 onwards giving a large number of performances. Travelling in groups by bicycle they were some times mistaken for family planning activists. Travelling in 12 groups in 1981, SAMUDAYA devised various ways to establish mass contact. One such method was to absorb local dialects in the presentations. Selling hand written cards and booklets were the principal means of financing.

SAMUDAYA's experience was closer to the experience of KSSP though the latter came to use art as only one of its media of communication. Starting in 1980 the KSSP has been embarking on a Sastra Kala Jatha for 37 days (from October 2 to November 7) every year from one end of the State to another. None among the KSSP's team is a professional artist. Most of them undergo an intensive one month long training during which various songs, plays, skits, folk arts are rehearsed and developed. However, as the groups travel, changes do occur in the form and tone of many items. The total decommercialisation of the performances, conducting them in open spaces in rural areas, the novelty in the techniques adopted (without any need for a 'stage'), the simple but striking attire of the artists and above all the 'piercing' nature of the social criticism have set a new trend in using people's art in communication. That a conscious attempt has been made to erase the distinction between the 'actor' and the 'spectator' has made the Sastrakala performance an endearing one to the masses.

That similar attempts are also being made in Sri Lanka, and a detailed account of it given by a fraternal delegate (from Sri Lanka), reiterated the power of this medium in people's struggles.

It was however felt that in the Indian context, effort should be made to exchange not only the experiences but also the

performances of different groups using art as a weapon in creating people's consciousness. This will not merely enrich the efforts of each other but will also act as a force in creating a feeling of solidarity among the people. Through such interchange they could see and understand the linkages between their micro and the macro situations. To move towards such a goal, it was decided that mutual exchange of visits should be organised in the coming year. The translation and adaption of the material used by different groups was also seen as an immediate and useful task to perform because many of the themes such as environment and health had common all-India appeal.

Genuine Interaction instead of Formal Coordination

It is significant that the Convention did not propose any formal arrangements for coordination of activities of different PSM groups at the all-India level. It was felt that the major concern of the PSM should be to create a fraternity throughout the country by a process of sensitising increasing numbers of the scientific community. This would ensure a stronger and lasting foundation than creation of formal organisational structures. With this objective in view, the Convention resolved to publish a magazine for communication among members of the different PSM groups. To start with, KSSP will be responsible for its publication. Organising and encouraging mutual visits to understand and interact with the activities of different groups was also agreed to. Such informal but purposive visits was thought to be an effective method for developing a fraternity. These visits should also lead to, it was felt, organising of workshops for coordinated activities in such areas as the use of the medium of art for communication with the common people. The offer by Kishore Bharati of Madhya Pradesh to act as an Information Cleaning Centre for issues relating to Environment and Development was wholeheartedly welcomed. The Delhi-based student- activist group Kalpavriksh offered its help in establishing such an Information Clearing Centre by Kishore Bharati.

The general consensus was that each group should be free to evolve and develop initiatives based on local conditions but at the same time a conscious attempt should be made to view them in an all-India perspective.

Some Fundamental Issues

While the main pre-occupation of the Convention was with the need to identify certain common areas for joint action, some time was devoted to a discussion of a few fundamental issues confronting the various groups. Broadly speaking, there were three different shades of understanding on and approach to the concept and relevance of PSM in India.

Firstly, it was argued by some that the PSM should concentrate on issues that fall on the interface between science and society. Hence the concern of PSM should be on the natural science content of such issues. For one thing, it was argued, that PSM is not the appropriate agency to engage in people's struggles. There are other mass organisations well equipped, conceptually and organisationally, for such tasks. This view was supported by a few others who defined PSM as something which should provide what they called 'scientific information' for effectively carrying out people's struggles by mass organisations. In this sense, PSM has only an adjunctive role. In such a conceptual framework, PSM has a large area of autonomy in terms of dissemination of information, sensitising the scientific community, suggesting solutions to social problems whenever there is a strong content of science and technology and above all create a scientific attitude among people and their orgnisations.

This understanding of the concept and relevance of PSM was too inadequate and restricted in its approach, argued some others. By People's Science Movement, what is meant is not dissemination of the 'natural science' content of social issues. That will be to restrict the meaning of 'science' as is done in our existing educational system. Science here should emphasize the need for an alternative method for understanding and analysing social issues. The link between natural and social sciences in this sense is organic and not separate. For every social issue there is a natural science content and vice versa. It only emphasizes the Man-Nature relationship but the Man-Nature relationship cannot be divorced from Man-Man relationship. The "space" that is emerging in our social context does call for the emergence of a PSM which while helping other mass organisations also establishes its own territory by directly going to the

people. This is becausc issues and situations do emerge when independent intervention of PSM is required.

However, what is required for various PSM groups is not mere "unity" against enemies of the people. Unity emphasizes only the negative aspect of coming together against a common enemy and hence exogenously determined. To pave the way for a new culture in which people's creative energies are released and channelised for the total development of human personality and society, "solidarity" is required which is endogenously determined. It calls for positive thinking and action for an alternative vision of the future. By blending the structured thoughts of the educated and the unstructured thoughts of the people into a common framework where theory and practice could be combined with people's development as the measuring rod, a genuine PSM should be initiated on the basis of solidarity of like-minded groups and persons. In this process one can visualize the space for various activities, sometimes reformist, sometimes revolutionary. But there should be conscious attempts to link dialectically the reformist practices with revolutionary transformation. This may sound too ambitious but there is no harm in high ambition if it is backed by genuine practice.

A third view, aired by some, was totally different from the above two. It was argued that the concept and meaning of science, as used has been derived from the western tradition. This tradition is not the relevant one to our context. Therefore an attempt should be made to turn to an indegenous concept of people's science and on that basis build up a perspective for science-based social activism in the country. It was however not spelt out what are the distinguishing features of this 'Indian Science' and 'Indian tradition' and how to go about examining them. What should be the measuring rod for the reconstruction of Indian concept of science? Some even contented that such a notion itself is irrelevant. Science is not religion or culture specific. Moreover, the historical experience of the development of science in India did not adequately support the people's initiatives for a change towards progressive social transformation. It was therefore doubted whether any useful purpose would be served by talking about an indegeneous concept of science.

III

REPORTS FROM PSM GROUPS IN OTHER PARTS OF INDIA

ROLE OF PSM IN PEOPLE'S MOVEMENT

A View from Lok Vidnyan Sanghatana (Maharashtra)

A People's Science Movement is being initiated in Maharashtra by the Lok Vidnyan Sanghatana (L V S). The L V S has set before itself the task of (1) fostering a pro-people alternative current amongst scientists and in the field of science and technology in general. This short note is an attempt to show as to how work done with this aim can develop a people's science movement. We shall illustrate this by briefly relating some aspects of the work we have done in the last three years.

Fostering Scientific Attitude and People's Movement

People's movement aimed ultimately at reordering our society on rational, scientific lines requires the growth of scientific attitude amongst the people. The tendency to blindly follow traditions and leaders becomes a hindrance in achieving the ultimate goal. A counter-culture imbued with a spirit of enquiry with detached, accurate observation and experimentation would definitely be conducive to enhancing the growth and the quality of People's Movement. Unless people start questioning their existing conditions, try to understand the whys and hows of their problems, people's movement cannot achieve its aim. India did not undergo the kind of renaissance, enlightenment which propelled Europe from the darkness of middle-ages towards the modern era. The historical and social context is different here. But a different version of renaissance consistent with today's needs is nccessary for the People's Movement to achieve its goal. P S M's contribution would be of use to create a spirit of lively enquiry amongst the people, towards a movement for a new world.

In Maharashtra, the People's Science Movement has upto now confined itself mainly to natural sciences, focussing on the problems at the interface of science and society.

How can such activity be helpful to People's Movement?

To start with, it must be clarified that each and every activity taken up by L V S obviously does not make direct contribution to ongoing people's struggles. Such a science movement can contribute mainly in a mediated, indirect way. Secondly, fostering scientific attitude can be done only through concrete action programmes of various types. One such activity is giving scientific analysis and information about phenomena about which people are concerned. The dominant system of science education tends to burden the students, and the people with a load of information which is mostly irrelevant to the people's life. The authority of experts is quoted to substantiate the do's and don'ts type of instructions when such science education deals with the problems and issues faced by the people. We try to avoid both these errors. For example, our first successful, popular pictorial exhibition was on woman's reproductive health, an issue vital for women but not taken up by any of the established science-institutions/organisations. In this topic we do not stress mainly on the question of family planning as is done in the official programmes of health education but the stress is to point out that the oppressive customs, and beliefs about women's reproductive system, are unscientific. (For example menstrual taboos, blaming woman for the infertility of the couple or for successively getting daughters and not a son, etc.). The small book on women's health published by L V S tries to give the rationale behind the recommendations made and the explanations given rather than just telling the reader to believe in what is being stated. Thus, not only the issues tackled but also the method of science education differ from the established method.

Taking up a campaign on a live issue which challenges beliefs dominant in people's mind and thus enhances their critical faculties can also be a method of inculcating scientific attitude amongst people. For example, we launched a campaign inviting the people to see the Solar Eclipse on 16th February 1980 with the help of solar goggles (priced one Rupee) that we had prepared. Through exhibitions, models, leaflets etc. we tried to put forward the scientific explanation of this phenomenon of eclipse and appealed to people to leave behind wrong concepts, tradition and enjoy the spectacle of the eclipse through solar goggles. This involved not only "understanding" but also acting in an unorthodox manner. This activity is to be seen

against the backdrop of the indifferent, apathetic and even superstition-fostering attitude of the established media and "scientific" institutions.

An activity which directly challenges "super-natural" tricks done by Godmen is another method of creating critical awareness amongst the people. The stress is on demonstrating various tricks, and on how to investigate the so-called supernatural phenomena (not relying on verbal account or only on superficial observation). These activities done with the collaboration of people's organisations render a people's movement a much broader character beyond struggle on mere economic and political issues. Enhancing a general critical attitude can create a cultural atmosphere where the task of creating critical attitude towards social issues can be made easier. At the moment we cannot claim that this actually happened because of our limited work, leaving aside the problem of how to evaluate the impact of this work in terms of the expected impact.

Fostering a pro-people alternative current amongst scientists

This activity would be useful to a people's movement in two ways:

1. Alternative science and technology

A social change does not mean only economic and political change, but a change in all spheres of life including the field of science and technology. S & T is not entirely neutral but is inevitably stamped with the specific characteristics of the society of which it is a part. This is true not only of the use of S & T but also of its content.

The production of scientific knowledge (research), its dissemination (education) and its use in the existing society are marked with a number of unhealthy characteristics. The method and direction of research in the West and in India have not been satisfactory. In India many scientific workers and organisations like Association of Scientific Workers of India (ASWI) have been making concrete criticisms about the research activity in India. We have not as yet worked systematically on this problem. But we are critical about the self-image of the majority of scientists in India. There has been a domination and glorification of specialized experts who are not concerned with issues

beyond their career and the narrow field of specialization—not even events within the field of science and technology, social implications of science, misuse of science, or unhealthy practices within the field of science and technology. It is the task of PSM to draw out scientists from their narrow shells by taking up activities on the interface of science and society to which they can contribute as socially conscious scientists. It is our experience that scientists come closer to social reality, and develop a pro-people attitude through such activities and an alternative current amongst scientists can be created through such activities.

What should be the principles of this alternative current? Scientific progress is a means of achieving human goals and not an end in itself. Consequently only that kind and tempo of development of technology which can be controlled by the people is to be funded. Research priorities would be decided by human needs and carried out by a democratically functioning team. Science education would be considered important and geared to enable people to control, and participate in management of S & T activities. Technology would be chosen only after giving due consideration to local ecology, resources, skills, knowledge, and a technology more amenable to a decentralized management would be preferred. Such a perspective is consistent with a people's movement basically aimed at people controlling their own lives and hence an activity in the field of S & T within this perspective is helpful to the achievement of the utlimate goal of people's movement.

In our pictorial exhibition on energy crisis, we have criticized the nuclear and thermal plants because such technology is ecologically disastrous and necessarily requires a secretive, authoritarian management due to the special fearful risk of sabotage, theft of radio-active material, etc. We have given stress on the development of solar energy and biogas plants which fulfil the criteria mentioned above. We have also questioned in this exhibition the useless sophistication resulting in the wastage of energy, so characteristic of the "American Dream". Such a technology geared to crass consumerism increases the necessity of centralized sources of energy supply with all its problems of ecological imbalance at the site of production and wastage in distribution. We have shown how such a system of energy supply is not geared to the end-use and

a lot of energy is wasted (for example in using electricity for heating–a very inefficient conversion of energy) thus aggravating the problem of energy supply.

In our science education programmes we have been giving stress more on enhancing the scientific and social attitude as mentioned earlier. We have prepared a People's Science Test different from the Science Talent Examinations conducted by the Establishment. A separate note has been given about this People's Science Test.

Lastly, we would like to stress that we aim at not only bringing people closer to science but vice versa also. This would require a change in science itself. What is scienc after all? The word "Science" should not mean only knowledge of causal relationship amongst various aspects of the natural world; it also includes the aims and method of generation of this knowledge, the aim, method and extent of dissemination of this knowledge, the aim, method and extent of its use and the relationship amongst people engaged in this activity. The sum total of all this constitutes the world of science and technology and this is not socially neutral. For example, medicines. The amount of research in and hence scientific knowledge about drugs on tropical diseases is comparatively much less vis-a-vis the needs of the people, but a lot of scientific knowledge is available about heart diseases. Drug companies try to suppress the knowledge of side effects of drugs and the dissemination of knowledge is also not geared to the needs of the people. The use of drugs is dominated by the interest of the drug companies and the doctor. The relations between people in this field of science and technology is centred around money and profits and not human needs. The sum total of all these characteristics constitutes today the science of drugs. This peculiar structure of science would fit into the category of "Establishment Science". Counterposed to this is the People's Science. In the case of drugs, the People's Science would consist of adequate knowledge about drugs efficacious in tropical diseases, a proper dissemination of knowledge about these drugs and their side-effects and use, geared to the people's needs. The sum total of these activities geared to human needs would be definitely different from the established science of today, though many of the building blocks of People's Science would be the same as those of the

'Establishment Science'. There is thus not only the question of misuse of science; the very character of the tool has been affected by its use.

Science in its present form can be and has been easily used as an alien force against the people. We are opposed to such a "religion of the modern society". The line dividing these two sciences is not very clear to us and overlapping areas are bound to be there. We therefore do tend to relapse into the methods of the Establishment Science but on the whole the aim is different. This aim is consistent with the aim of the people's movement.

2. *Bringing forward scientific aspects of the people's demands*

There are many just demands of the people which have a basis in natural science. People's movement would require the help of PSM to bring forward these scientific aspects. The demands could be related to their immediate interests or to the long-term aim of restructuring our society. If the scientific aspects are brought forward, a number of people, who would otherwise oppose these demands would stand by keeping aside their prejudices. For example, the issue of determining wages for agricultural labourers here in Maharashtra. The Maharashtra Government had appointed a committee to determine minimum wages for agricultural labourers. The Wage Committee decided to take the food requirement of agricultural labourers as the basis for calculating their minimum wages. But, while doing so, it based itself on unscientific assumptions about the food requirements of agricultural labourers. This was first pointed out by a doctor—Abhay Bang—working with agricultural labourers. The L V S took up an educational campaign on this issue amongst the people in general and agricultural labourers in particular. A signature campaign was launched wherein we collected signatures of doctors and nutritionists on an appeal in which the Wage Committee was urged to re-examine its nutritional assumptions. Through this signature campaign, we wanted to expose scientists to the people's problems through an issue in their own field and commit them to a scientific position related to a people's problem. Through this campaign, the scientific aspect of the issue was brought forward to the

notice of the people (through newspaper articles etc.) and this created a better basis and support for the demands of the agricultural labourers. We could not however gather enough strength to compel the authorities to change the decision or the nutritional assumptions of the Wage Committee. Scientific rationality has to be backed up by adequate political power.

Fire-proof huts is an example of appropriate technology which can directly contribute to the people's struggles. The huts of agricultural labourers catching fire is a recurring, widespread phenomenon. The simple procedure of treating the building material with di-amonium phosphate (a complex fertilizer) renders these huts fire-resistant.

The Consumer Movement can benefit from PSM. Many products, for example medicines, are dumped on the consumers by unfair means. Pro-people scientists can help the consumer movement by pointing out the precise technical hitch involved. For example, the L V S launched an educational campaign on ill-effects of the drug-combination of high doses of hormones, oestrogen and progesterone used to diagnose pregnancy, against the reckless sale of this drug and for a ban on this combination itself. A campaign was also launched about the rational treatment of ordinary diarrhoea (mainly oral rehydration), the misuse of and reckless sale of useless, harmful drugs in diarrhoea.

The Peace Movement—The nuclear arms race involves the grossest misuse of science. Socially conscious scientists must oppose this misuse and join the People's Movement for peace. The specific contribution of scientists can be of drawing out concretely the hazards of nuclear radioactivity, thus using their knowledge for the people's movement. If this is done, the peace movement can get a firmer basis and a boost. Many scientists as individuals or as PSM groups, have done this all over the world. We have prepared pictorial exhibition on the disastrous effects of war in general and nuclear war in particular. It was shown at a number of places and has become very popular and has been of help to the Peace Movement organized by some of the political parties in Maharashtra in October 1982.

Rational Utilization of Natural Resources

Many of the natural resources are being used today in an irrational, wasteful, and ecologically destructive manner. In

protest, a number of ecology-groups have sprung up all over the world. This movement is still embryonic, but important and PSM can play a very important role here.

In Maharashtra less than 9% of the cultivated land is under irrigation. This situation is partly a result of irrational, wasteful utilization of water. Such use deprives a number of potential beneficiaries and damages the lands of those who indulge in reckless use. But they are not concerned since they are getting handsome profits today by raising money-spinning crops like cane sugar for cooperative factories. It is necessary to point out the irrationality of the existing pattern of utilization of the scarce resource-irrigation water and popularize the rational, egalitarian method of use of this resource. Ground water is also being recklessly used, overlooking the risk of drying up of ground water accumulated over thousands of years. Today there is no people's movement on this issue. But this is to be taken up if the interests of the majority of the toilers of the soil, of our future generations have to be safeguarded. Arun Deshpande, the General Secretary of L V S, is working as a full timer with the help of the Pune Unit on this problem. The work of opinion building is being done amongst concerned scientists and amongst the farmers. In an area around the village Mangalwedha, Arun Deshpande and R P Deshpande have launched a successful educational campaign amongst the farmers about the irreversible damage that will afflict their land if the irrigated water (to be available shortly) is given in excess. In a backward area like Mangalwedha this could not be done without a strong people's movement. But in developed areas the big land owners would oppose rational utilization of water resources on account of their myopic interest in the existing irrational use. We hope that the people's movement in Maharashtra would one day start mobilizing people on this issue.

Thus the contribution of PSM to People's Movement would be mostly mediated indirectly. The link today is weak but we believe that when the People's Movement goes beyond immediate issues and comes closer to its goal of restructuring the society on scientific, humanist basis, the link between PSM and the People's Movement would become stronger and more apparent.

Relations with people's organizations

A science organization should not be attached to any particular political party but should work in collaboration with various people's organisations depending upon the problem concerned. There are some activities where people's organisations do not directly come into the picture, for example those controversies in science which have a bearing on social life (for example controversies about I Q tests, safety of a particular medicine, etc.). Problems like management of scientific research, or about the curriculum and method of teaching in science would by and large be taken up by organisation of scientific workers.

Other activities however, require active help from people's organisations. For example, nonformal science education programmes taken up by PSM would be considerably helped if they are taken up with the help of people's organizations. The Lok Vidnyan Sanghatana tries to work in collaboration with local people's organisation. This is necessary to establish a proper rapport especially with the poor, semi-literate population on whom we have focussed our attention in our science education programmes. The Vidnyan Jatra (Science Fair) in April 1980— The Vidnyan Yatra (Science Tour) conducted in October 1982 could not have been successful without the active help of social workers and local people's organisations.

In the campaign against beliefs in "supernatural wonders" by godmen, we organised a training programme for activists of some people's organisations because we believe that such campaigns could be more effective if they are taken up by such activists as a part of their work.

When PSM gets involved in people's problems in order to throw light on the scientific aspects of the problem, people's organisations naturally play a leading role. For example, in the issue of minimum wages for agricultural labourers, L V S cannot do much beyond drawing out the scientific basis of the demand.

In our efforts towards creating a lobby in favour of rational utilization of land and water resources, we have planned a training programme for activists of people's organisations. After all only people's organisations can build up sufficient pressure in this connection. Our role here is only catalytic.

PEOPLE'S SCIENCE MOVEMENT

A West Bengal Perspective

In West Bengal, People's Science is not just a recent slogan. Great scientists like Acharya J C Bose, P C Roy, Satyen Bose and Meghnad Saha felt strongly committed to the society. These leaders of Science have left various ideas, programmes and institutions in West Bengal--which have left its imprint in the field of People's Science. Some of them were active in anti-imperialist struggles against British; even after independence many continued thinking and working in the interest of the people.

But the reality in present Bengal shows a gloomy picture altogether. West Bengal has gone down to eleventh position in literacy with electrical energy and productivity declining in proportion. The agony for social change is flowing underneath.

People's Science has been uttered and is still being uttered in West Bengal in a vigorous way. Various science organisations and science associations were and are being formed, speaking in the interest of the common people. But men of dedication and democratic spirit are becoming gradually a minority in these groups. Progressive and hopeful organisations have gradually become bureaucratic, traditional and basically isolated from the common people, about whom they talk so much.

If politics is understood in the sense of present day party politics and party interaction in social programmes, then politicisation has become all-pervasive in West Bengal. Many committed individuals and some voluntary groups were found impatient in their emotion to form or join political parties, launch programmes in over-enthusiasm and ultimately isolating themselves from the people for lack of preparation.

People's Science attempts in West Bengal are to be understood in this perspective. To learn is yet to be practised by scientists. Science-loving people of the State realize that there is some infra-structure present, though not developed according

to people's aspiration and participation. Various individualistic tendencies matched with radiant attitude of some and some with old, traditional belief are present in different platforms. Scientific Worker's' Forum, Bangiya Vigyan Parishat, Bikshan, Chandabrati, Gana--Vigyan Samannaya Kendra, Eastern India Science Club Association are some of the organisations which try propagation of scientific culture among the masses, through different media like bulletins, magazines, visits throughout the State, postering, direct contacts and programmes, etc. They differ in their approaches, but in many such platforms there are scientists and technologists who want to positively contribute to people's struggle by people's power. There are also certain groups of activists, who are working at the grassroot level and are eager to contribute to attempt a People's Science Movement. Lack of proper linkages and groups being limited to small pockets has made co-ordination quite feeble.

In this perspective, Eastern India Science Club Association has been able to affiliate nearly hundred science clubs of the State. Mode of functioning of EISCA is also in a decentralised way, so that science clubs have been found going from strength to strength gradually through this association. EISCA is trying a broad platform and an intimate link with grass root activists working at different places. I, a member of Chandabrati, have also come into contact with them in this process. I find that in spite of naivety at the initial stage, EISCA is ably trying to encourage, and initiate different science–clubs scattered throughout the State in villages and towns. These science clubs along with voluntary organisations of genuine pro–people attitude can forge an effective People's Science Movement in the State. In spite of different sociological odds today science is the strongest weapon which people of the State can use to struggle against social oppression. In this connection, EISCA organized seminars, magazines, cross–visits, common meetings and conferences of science clubs. Audio-visual method, befitting posters, and dramas have also been utilised by many member clubs and friendly associations and forums.

We from Chandabrati have been trying a process by the people to bring about a social change through assertion of their power. We try this in small pockets through people's struggle to gain control over economic, cultural and socio-political

decisions for reaching a structural change of the society. These attempts demand an in-depth process of conscientisation and wider link with groups and individuals working at different places. We have tried contacting people and groups inside and outside the state. KSSP also has helped us in this process in many ways.

MEDICO FRIEND CIRCLE

Perspective

Medico-Friend Circle is a group of socially conscious individuals, interested in health problems of our people. MFC is trying to evolve an appropriate approach towards developing a system of medical care suited to the needs of the vast majority of the population in our country.

We have come to the conclusion that the existing system of medical care is not geared to the needs of the people and requires a fundamental change. Such a change would come about as a part of the total social system of which medical system is only a part. The potential created by modern medical science cannot be realized properly without such a fundamental change in the social system.

What is wrong with the existing medical system?

*Though there has been a rapid growth of the medical services organized by the Govt, private practice remains the dominant feature of medical care. In private practice, medical care is a commodity in the market, available only to those who have money for it, and medical profession resembles any other commercial sector. It is thus being dominated by the concern for money than for the patients. The commercial and professional interests of doctors impels them to keep a monopoly over medical knowledge. This monopoly and the commercial interests of doctors together lead to numerous malpractices in the system. Added to these are the interests of profit-oriented drug companies which dump many useless or even harmful drugs onto the consumer through co-option of doctors.

Medico-Friend Circle upholds the interests of the people, wants medical care to be available to every one irrespective of his/her ability to pay, would seek to demonopolize medical knowledge, and wants to develop an approach of medical intervention strictly guided by the needs of our people and not by the needs of commercial interests.

*Since the purchasing power is mainly concentrated in cities, commercial medical practitioners have flocked mainly to the cities. This over-crowding in the cities is partly responsible for the overgrowth of specialists and for denigration of the role of the basic doctor to "cough and cold" doctor. The training of doctors has also been influenced by this situation. Hospital based training by Western and Urban oriented specialists creates a graduate conditioned to urban and hospital set up. Even after the prolonged training in medical college, such a graduate is not capable of dealing with the situation in rural areas.

MFC would work towards a medical-care adequately geared to the rural situation of our country and towards medical curriculum and training tailored to the needs of the vast majority of people in our country.

*Medical knowledge has been jargonized and mystified to prop up the status of the medical profession (with the doctor at its head). This mystification also creates a "scientific" basis for the hierarchy amongst different members of medical profession.

Medico-Friend Circle stands for popularization and demystification of medical science and believes that different categories of medical professionals be regarded as equal members of a democratically functioning team.

*Commercial interests demand a growing market for drugs, medical therapies and this is partly responsible for medical practice being reduced mainly to curative services. It denigrates the primary role of preventive and social measures. A wrong image is created that medical intervention—use of drugs, surgery etc—is primarily responsible for improvement in the health-status of a population.

Medico-Friend Circle believes that though modern curative technology can be important in saving a person's life or preventing disability, health problems on the social scale can be solved primarily by preventive and social measures.

*The Govt. health sector is not commercial and P H C doctors are supposed to emphasize preventive medicine. But this sector has not changed the basic pattern outlined above. The doctor working in PHC is inclined and trained to do mainly curative, clinical work and is generally imbued with the typical

attitude of the upper class, urban, elite professional.

Preventive measures are reduced to pure technological and administrative measures shorn of social content.

MFC stands for primary importance to preventive measures planned and carried out with the active participation of the community and for decentralization of responsibilities whenever possible.

*Medical practice in its existing form reinforces the predominant cultural values, attitudes in our society, glorification of money, power, division of labourers into manual and intellectual labourers, domination of man over woman.....

Medico Friend Circle works towards a medical practice which is structured to and aims at fostering of human values-concern for human needs, equality, and democratic functioning.

*In our medical system, non-allopathic therapies are given a step-motherly treatment. MFC believes that research on these therapies be encouraged by allotting more funds and other resources and these therapies be encouraged to take their proper place in the modern system of medical care.

MFC thus tries to foster amongst medicos a current upholding human values and aiming at restructuring medical profession to enable it to realize the potential created by modern scientific medicine.

MFC offers a forum for dialogue/debate, sharing of experiences, experiments with the aim of realizing the goal outlined above; and for taking up issues of common concern for action.

Activities

MFC members are scattered all over India and try to propagate the perspective of MFC through their practice. Some members are engaged full-time in organizing health-projects in rural areas.

*MFC is mainly a thought-current and the monthly MEDICO FRIEND CIRCLE BULLETIN now in its eighth year of publication, is the medium through which members communicate their ideas and experiences to each other. The Bulletin publishes articles broadly reflecting the MFC perspective on health problems. Running the BULLETIN is our chief *common* activity.

Publication of the ANTHOLOGY of selected articles

published in the Bulletin has been a mile-stone in the development of MFC. The first anthology—"In Search of Diagnosis" was very well received and was rapidly sold out. KSSP translated it into Malayalam (two editions). The second anthology—"Health Care– Which way to go?" has been equally appreciated. (Pages-260 price Rs. 10/–, for foreign countries–4 US dollars plus postage).

*Once a year MFC members gather at an All-India Annual meet to explore a relevant topic through discussion or to understand the functioning of a particular health care project in terms of a chosen topic. Since 1974, annual meets have been held at Ujjain (relevance of the present health services), Sevagram (present health problems), Hoshangabad (Indian nutritional problem), Calicut (community health approach, role of doctor in society), Varanasi (unemployment among doctors) Jamkhed (community health worker), RUSHA Project (community paediatrics), Tara (misuse of drugs by doctors), Anand (prejudice against women in medical care).

The ANNUAL MEET provides an opportunity for medico-friends from different parts of the country to meet each other and for establishing links with new members.

*Study and action-projects by local groups, regional camps to understand a local health problem and its broader dimensions, health educational campaigns are other activities through which MFC has grown and consolidated.

Organization

The Medico-Friend Circle is not a rigid organization. It is loosely knit, composed of friends from various backgrounds, usually medical to start with, often differing in their ways of thinking and in their modes of action. But the understanding that the present health services and medical education system is lopsided in the interest of the privileged few and must change to serve the interests of the poor people of India is a common conviction.

PATRIOTIC AND PEOPLE-ORIENTED SCIENCE AND TECHNOLOGY (PPST) GROUP

The Patriotic and People-Oriented Science and Technology (PPST) Group was formed in 1980 and consists mostly of the persons belonging to the scientific and technological, academic and medical community, students, social workers and socially conscious intellectuals from different parts of our country. Its attempt so far has been to start a debate amongst the intellectuals of our country on the questions related to science, technology, development and social change. The main activity of the group so far has been the publishing of a bulletin in English called the *PPST Bulletin* of which four issues have so far been brought out. The PPST group has also been trying to raise these questions in whatever forums and media available. Our understanding and views are briefly summarised below.

It is our understanding that the process of development being pursued since our independence has not been able to meet the basic needs of the vast majority of our people—needs like food, clothing, shelter, health, education and freedom. The paths of development chosen has been an imitation of the western urban-centred model with a few urban enclaves as its focus, the beneficiaries being primarily a small class of westernised urban elite having little in common with the vast majority of our people. We do not see the underdevelopment of most of our country as resulting from an insufficient overall development; we believe that the underdevelopment is necessarily a consequence of the type of development that is seen around the few urban centres. Thus the development in agriculture with the name of Green Revolution in a few pockets have been brought about by depriving most of the other agricultural areas of any resources; development in medical education and facilities in a few urban areas have been achieved by depriving the rest of the people of any viable system of health care, and so on.

Even where development appears to be more evenly distributed (like in communication and transport), one can see that its main purpose and function have been to make the human and material resources available at a few centres cheaply and quickly. The central feature of all of our developmental activities has been an increasing concentration of all our resources in centres (thereby increasingly depriving the majority of our people of their sustenance) where it is wastefully consumed to prop up a westernised mode of existence. This is the central feature of all the so-called modernisation processes that have been pursued in the name of development and progress—in agriculture, health, education, dairy, fishing, forestry, textiles, etc. This process of extraction of all resources from the people and their removal to the metropolitan centres, is the classic colonial mode of development—that these metropolitan centres are mostly *within* our country today has made little difference for the vast rural areas of our country. Furthermore, even with this mode of development, or more properly, *because* of this mode of development, there has been an increasing compromise on our national self-reliancce and independance; our dependance on foreign powers for capital, technology and knowledge has been ever increasing. In short, it is our understanding that our developmental process has been ill-conceived on both the counts—either in meeting the basic needs of our people or in achieving notional self-reliance.

We believe that a central role in this process has been played by the philosophy and practice of modern science and technology in our country. Indiscriminate incorporation of modern science and technology that are developed in the west has greatly aided in pushing through the kind of developmental process that we have outlined earlier. Starting from the axiom that all that is there in the modern science and technology is good for all the people everywhere and that the latest is necessarily the best, all our developmental thinking has been inspried by the notion that our salvation lies in incorporating as much of modern science and technology, at whetever cost. In fact, any developmental activity can be justified if it claims that it incorporates the latest in modern science and technology, no matter how irrational, unproductive and even harmful the pursuits are. Having surrounded the modern science and technology

with an aura of mystery, the common people are not even permitted to ask any questions concerning their need for it, its effect on them, etc. They are told that only a few experts can understand it, and they will be the people to decide on it. A White Revolution that deprives our village people of their milk so that it is abundantly available in a few cities is justified in the name of modern dairy practice; a Silver Revolution that deprives the vast majority of our fisher-folk of a livelihood so that fish is plentifully available in a few urban areas is justified in the name of modern fishing; a Forest Policy that deprives our tribals of their livelihood and plays havoc with the environment so that the forest produce is available for industrial use in the urban areas is justified in the name of modern forestry; a Green Revolution that destroys the soil so that the agricultural produce is made available in the urban centres is justified in the name of modern farming--and so on. In short, it is our understanding that the use of modern science and technology has greatly aided in bringing about this kind of development that we have been witnessing.

It is often suggested that it is the existing social structure and not the science and techology employed that is the primary reason for such developments that have led to the increasing impoverishment and misery of our people. We agree that no change in the situation can be brought about unless the social structure is altered. Nevertheless what is often not seen is the close link that exists between the science and technology employed by a society and the social order that prevails. Science and technology play a central role not only in organising the forces of production in our society but also even in the very process of choosing a given path and pattern of development. Modern science and technology play a key role in perpetuating and legitimising the present philosophy of development. We thus see that the question of changing the present social sturcture can be meaningfully addressed only if there is a correct understanding of the integral link between the social structure and the prevalent science and technology, which play an important role in legitimising this social structure.

We believe that the legitimising role played by modern science and technology has not been sufficiently grasped; any opposition to even the most blatantly ill-conceived and disastrous

plans and schemes get blunted because of the claim that are based on the latest scientific and tcchnological findings and break-throughs and because of the awe that such a claim strikes in the minds of all. The true nature of the interests and motives behind these schemes can be laid bare only if we refuse to be browbeaten by such claims of scientificity, technological soundness etc; only if we can assert that we are opposed to all those schemes and plans that are useless or harmful to the interests of the majority of our people, no matter what the level of science and technology involved; only when we refuse to be confused by all this talk of wonders and achievements of modern science and technology. This task of demystifying the modern science and technology, of exposing the true nature of the interests that it is hiding and serving, can and should be undertaken by the conscious members of our science and technology community, This is one way in which we can aid in bringing about a social transformation.

Furthermore, we suspect that the role played by the modern science and technology in supporting and strengthening an unjust social order in our country may not be purely accidental. In other words, it may not be the case that this science and technology is as such good and faultless, and that the problem lies entirely with the socio-political system in which it is being practised. It appears that there may be definite features inherent in this science and technology that make it the natural choice in pursuing such a path of development. It seems to be inherent to this science and technology (its philosophy, organisation and practice) that it becomes viable, efficient and optimal only when the resources and knowledge have been taken from the common people and they no more have any control over it. If this is indeed so, then it follows that any society which bases itself on the philosophy, organisation and practice of modern science and technology, may tend to develop the features of concentration and wasteful use of resources and knowledge, ecological destructiveness, concentration of authority and power, negation of democracy and egalitarianism, etc; in short, it may not be a fundamentally different and more humane social order. This question becomes an important one when one is working for a social transformation, when one wants to find a fundamental alternative to the present unjust order. We believe that

a fundamentally new enquiry into this aspect of modern science and technology must be conducted using all the available historical data related to it; like all other institutions of bourgeois society, modern science and technology must also be subjected to a critical inquiry. And, if it is seen that modern science and technology is inseparable from the values of the western bourgeois social order, then what is called for is its rejection, and evolution of a fundamentally different system of science and technology which will be compatible with our conception of a more humane and egalitarian social order.

It is evident that a search for an alternative to modern science and technology can only be a component part of a broader search for alternatives to the modern Western notion of social organisation, objectives and paths of devlopment, conceptions of the relationship between the individual and the collective, views on the relationship between man and nature, etc. It is our belief that our country, with a long tradition of its own distinct science, technology and culture, is in a unique position to undertake this task and evolve an alternative order. While it is obvious that our tradition (like any other tradition) is not altogether faultless and hence cannot provide a ready-made solution, we however believe that it can and must serve as a starting point in any search for a fundamental alternative. An inquiry into our traditional systems of knowledge, beliefs and practices–the values they incorporated and propagated, the institutions they gave rise to and supported, the conception of man and nature they carried—must be undertaken for this purpose; this would be a fundamentally different type of enquiry which does not accept the norms and values of modern science and technology as the unique measuring rod to evalute all other knowledge systems and cultures. We believe this to be an important task the conscious members of our science and technology community must undertake in their endeavour to bring about a social transformation and to establish a better social order where the basic needs of our people will be met and the independence and self-reliance of our country will be safeguarded.

PEOPLE'S SCIENCE MOVEMENT IN ANDHRA PRADESH

1. Why should there be a People's Science Movement at all?

The question "Why should there be a people's science movement at all?" was born long back and has been debated time and again and is still being debated in various progressive thinking intellectual circles in our State. A powerful section strongly opines that there need not be a separate people's science movement as a popular people's political movement inherently contains in itself such a movement and all the intellectuals should basically strive for building up of a popular people's political movement. They argue that such a build-up is most essential and no energies are to be diverted or misused at the present stage as any deviation from this fundamental concept will lose its base and bearing.

The other section argues that a people's science movement is not only necessary but is most essential to hasten and activate the political movement, and a people's science movement will defenitly help the public at large to identify and understand the real basis for various social and economic problems and to educate them to visualise the need for the necessary struggle. Hence due importance is to be given to the building up of the people's science movement.

2. Birth of Sastra Vignana Prachara Sabha (SVPS)

Against this background SVPS was born in Andhra Pradesh. KSSP was the source of inspiration to the founders of SVPS in Andhra Pradesh.

3. SVPS's understanding of People's Science Movement.

Our society reflects two different attitudes. One, the scientific and the other unscientific. The unscientific attitude is governing the society at present and the scientific attitude is mostly lacking. The scientific attitude starts with questioning any subject matter. It strats with 'Why & What' whether the

subject is of social, economic, political or the one relevant to nature. It systematically discusses, observes, analyses and out of practice brings out the truth applicable to the society as a general phenomenon. Whereas the unscientific attitude stands on belief, traditional thinking, on epics, on religious preachings and scriptures etc., giving no room for objective analysis. The unscientific attitude deals subject issues as separate entities. It links up everything with God, belief and 'atma', whereas the scientific attitude clearly visualises the link between various issues and subjects. It tries to find out solutions with wisdom and social commitment.

Whatever may be the attitude, in practice, every one of us will be influenced by the changes of nature and society. None of us deny the various facilities that are brought into the daily use of life through social and scientific struggles brought forward by the history of mankind. It is also a fact that various Godmen, Sanyasis or of such sort will be the first people to enjoy the fruits of science, being in the first ranks of the society, being recognised by the ruling classes as a special sect and messiahs, even though the essence of their preachings are alien to scientific thinking.

Such characters are flourishing in society out of the ignorance and innocence of the masses at large. Once the people understand the mechanics governing the society such characters will automatically be abolished.

This unscientific propaganda, unscientific thinking is the root cause of the present state of affairs in our country. One should clearly take note of the forces who back up and arm this sort of unscientific thinking. The same forces who wish to retain power in their hand for ever struggle hard, fight tooth and nail to curb or crush any scientific upheaval in whatever form it takes shape. Hence a people's scientific movement is a historic necessity and has to play a powerful role in the times ahead.

4. What we are doing at present

We should agree that we have not crossed the infant stage so far. Our membership has not crossed the 200 mark and we have not covered even the majore cities except that of Vijayawada and Visakhapatnam. We are on the move to enroll

members districtwise and to organise local unit extensively.

We have convened two public meetings: the first one an introductory meeting of SVPS and the second one a popular lecture by Prof. Sivaji Rao on problems of pollution in Andhra Pradesh.

We have published two books, one a compilation of essays in Telugu titled "Scientific Outlook for Progress" and the second one, a book for children, "Nature, Society & Science" in Telugu based on the original in Malayalam by Sri K.K. Krishna Kumar.

Our Future Programme

1) We are planning to convene a seminar by the end of March 1983 on "the building of a powerful scientific movement in Andhra Pradesh—the ways and means for popularization of scientific thinking".

2) We are planning to hold a statewide convention of SVPS by the end of May 1983.

3) We are planning to bring out a monthly magazine as an organ of SVPS.

4) We are planning to bring out at least four books in this year on popular science.

5) We are also planning to form a cultural wing of SVPS to go to the masses for popularizing scientific thinking.

6) We are planning to conduct quiz competition, debates, essay writing for school children and college students at regular intervals.

7) We are planning to conduct a parents' meet on a selective basis (limiting to certain number of schools and colleges at a time) to make them identify the importance of scientific understanding in bringing up their children.

PEOPLE PLANNING AND SCIENCE IN SCHOOL: A REPORT FROM VIDUSHAK KARKHANA

Background

Shahdol district lies in the Eastern part of Madhya Pradesh and is neatly bisected into two by the river Zone as it descends from the Maikal ranges and courses north-westwards before making its sharp turn to the north-east on its way to join the Ganges near Patna. The area is situated in the Vindhyan ranges, is undulating, and provides the catchment for the waters of the upper Zone. Agriculture is primitive and single-crop with only 2% of the cultivated land being irrigated. There is a fair degree of industrialisation with a giant paper factory, a thermal power station, several coal and bauxite mines, and the railways. Tremendous expansion has taken place since 1950 in the exploitation of the forests for timber and minor forest produce (which yields an annual revenue of about Rs. 4 crores). All the 'development' has not benefited the local people by and large and poverty is widespread. Approximately 30% of the total population comprises the working population and wages are normally Rs. 4 for men and Rs. 3 for women. There is massive un-and under-employment; 5% of the population has enrolled in the local employment exchanges for jobs. The Shahdol team (essentially a group of professionals) has been attempting to study and act in this district since 1973, trying to correlate various aspects of development, ecology, planning, technology, and education to an understanding of the structural transformation of society.

Some issues

Two members of the Shahdol Group attended the first All India Convention of People's Science Movements sponsored by the Kerala Shastra Sahitya Parishad at Trivandrum in 1978. The Convention was a pioneering attempt to understand the

form and content of the People's Science Movement under the slogan of *Science for Social Revolution* and it helped us to place our own activities in a national perspective. However, willingly or otherwise, our comrades also began to see the relevance of a number of issues thrown up by the experience of the Kerala Shastra Sahitya Parishad (KSSP). Briefly, the issues were as follows:

1. The difference in the conditions of Kerala and Madhya Pradesh,
2. The relationship between Science and Society.
3. The understanding of which section in society provides the thrust for People's Science Movement (PSM) activity.
4. The relationship between PSM and People's Organisation.

Over the last four years we have tried to study these issues and now present some of our findings.

1. Kerala and Madhya Pradesh

There are startling differences between the two States in the context of PSM efforts. Some of them are enumerated in the following table:

S. No.	*Factor*	*Kerala*	*Madhya Pradesh*
1.	Area (sq. km.)	38,864	4,42,841 (M. P is almost 12 times bigger than Kerala)
2.	Population (1971)	2,13,47,375	4,16,54,119
3.	Density (per sq.km)	549	94 (the All-India average is 178)
4.	Irrigated land (%)	20.2	10
5.	Cash crops	Cashewnut Arecanut Coconut Cotton Oilseeds Pepper Sugarcane	Oil seeds Cotton Sugarcane

S. No.	Factor	Kerala	Madhya Pradesh	
		Rubber Coffee Tea Cardamom (Kerala essentially has a plantation economy)		
6.	Food crops	Rice Tapioca	Jowar Wheat Rice Gram	
7.	Forests	24%	30%	
8.	Minerals	Ilmenite Rutile Monazite Zircon Sillimanite Quartz sand Lime shell	Coal Iron Ore Limestone Dolomite Bauxite Diamonds Manganese ore	
9.	Industry	Rubber Tea Ceramics Electronics Telephone cables Bricks & Tiles Durgs & Chemicals Soaps, Oils Fertilizers Machine tools Aluminium Rayon Plywood, pulp, paper Non-ferrous metals	Steel Heavy Electricals Textiles Newsprint Paper Potteries Cement Engineering tools Biscuits Rayon Art Silk	
10.	Education (%)			*All India*
	Age group 6–11	?	65	82
	11–14	?	28	35
	Literacy	54.31	10.92	18.70
11.	Land ceilings (ha)	4.86–6.07	4.05–21.85	

Sl. No.	*Factor*	*Kerala*	*Madhya Pradesh*
12.	Number of Broadcast Receiver Licenses		
	Total	5,68,913	5,21,966
	Domestic	5,15,187	4,27,576
	Concessional	37,315	33,533
	Community	3,295	1,127
	School	1,106	263
	Hospital	107	70
	Urban	4,740	5,910
	Rural	5,362	839
13.	Formal education system	Almost every village has a school. The system has been growing from the second half of the 19th century.	Of 70,883 villages only 45,308 have primary schools. The RSS-dominated Saraswati Shishu Mandirs are wide-spread.
14.	Non-formal education system	Library movement began as part of the Independence struggle. Non-formal education was part of the activity of radical political parties since the 1930s, for the politicisation of the masses. News paper reading is widespread through the Granthshalas.	Pathak Manches have only recently begun under Govt. aegis. The Govt. has recently begun 5000 centres for Non-formal education under four schemes: a) allied to formal system b) NCERT schemes; c) Panghat Yojana; d) Earn-while you-learn.

In brief, we had to seriously question whether, in the absence of all the features dominant in Kerala, KSSP-type of activity could be started in Madhya Pradesh.

2. *Science and Society*

It seems to us that, subsequent to the 1978 Convention, the various attempts to begin and sustain PSM activity in Maharashtra, Karnataka, Delhi, and Madhya Pradesh on the lines of, or similar to the work of KSSP have all run into difficulties emerging out of the specific social and economic conditions of the respective areas. However, this is an issue which we hope these colleagues who have come to this Convention of 1983 from the above areas will address in greater detail. On our part we felt it important to come to a concrete understanding of the specific dynamics of the area in which we were working, Shahdol, and then to see what form PSM activity could take. To this end we collected data for all the various sectors of the economy in Shahdol as well as their social and political relationships. A brief overview of all this data assured us that exploitation and appropriation have expanded on a vast scale over the centuries, but more so in the years after 1947. This led us to the conclusion that Planning as a State-sponsored exercise was not leading to the egalitarian growth that was desired. Indeed, a deeper investigation into the theories of planning convinced us that State Planning in India was based on the Theory of Central Places and that this theory is one that is adequate to explain the process of accumulation of wealth by a few but is not, and cannot be, used for structural change. Hence, we tried to develop an alternative theory of planning which would support and enlarge the struggles of the people for a better life. This theory we have called the Demand Model of Planning. Briefly, the Demand Model can be explained as follows:–

Planning we defined thus: "All Planning is for the resolution of conflicts". We took the specific case of Environmental Planning because it is the most comprehensive of all planning exercises and, by looking into its historical evolution, defined it as "that political exercise in the allocation and management of resources which improves the well-being of those engaged in production, prevents the harmful by-products of industrialisation, and conserves the natural resources".

Conflicts we saw as the manifestation of underlying contradictions and a single contradiction could manifest itself in different conflicts in different conditions. There were two kinds of conflicts: Man-Nature and Man-Man. The specific way in which planning was used to resolve the conflicts gave rise to a Model of Plannning. The Demand Model, we stipulated, was that model of Planning which would attempt to resolve both kinds of conflicts. And the Demand Model would, therefore, be one which:

a. Identified all the conflicts;
b. Interlinked them together to discover the underlying contradictions;
c. Yielded a resolution of the contradictions.

3. The Thrust for PSM

We applied our understanding of the method of the Demand Model to the data we had collected for Shahdol to discover the specificity of the district for PSM activity. At the first stage we were able to identify 101 Man-Man conflicts and 25 Man-Nature conflicts as perceived by the people. In the second stage we grouped these conflicts into 54 Clusters on the basis of the issue around which the conflict was taking place: irrigation, employment, wages, deforestation, pollution, etc. For the third stage we linked these Clusters into Networks, the basis being the common strata involved in the various conflicts within each Network. Ten Networks emerged and these could be further linked, at the fourth stage, into three Contradictions which underlay all the conflicts. Finally, at the fifth stage, we were able to identify the Central Contradiction which was common to all three Contradictions of the Fourth stage. At the level of the Central Contradiction we were also able to identify the two major strata in society which opposed each other with a third strata vacillating between the two. Thus, concretely for Shahdol district, the Central Contradiction was over Control of Resources, and we could see how this manifested itself in the daily life of the people through their 101 conflicts. On one side of the Contradiction were arrayed the classes in power—the industrial employers, managements, landlords, moneylenders, major traders, banks, government and its officials. On the other side were the people—the industrial workers, artisans, petty

traders, landless, marginal and small farmers, students, and lower-level employees of government institutions and agencies. And in between the two vacillated the middle and rich farmers, the minor traders, union leaders, vehicle owners, and middle-level employees of the government. For resolution of all the conflicts, therefore, the Demand Model showed only too clearly the bankruptcy of the classes in power and demonstrated theoretically that only the people could resolve their problems provided they resolved the Central Contradition, the control over resources. Thus the thrust for PSM.

In this manner we felt that we had presented a Theory of Society too; a way to understand the dynamics of the movement of social strata in Shahdol both in spacific as well as general terms. And the Demand Model yielded for us a Theory of Education also: a recognition of the fact that people as living human beings were conscious of their daily problems (what we called conflicts) but had to become aware of the Central Contradiction through their practice before social transformation could take place. For us, this was no longer an abstraction but part and parcel of people's struggle for a better existence.

4. PSM and Organisation

Finally, we come to the perspective of our present work. A Theory of Education demands that people begin travelling the long road from manifest peripheral canflicts towards an understanding of social contradictions. Thus far we have conducted several educational experiments with different sections of the 'people' at a micro-level. These experiments may be enumerated as follows:

a. technical training at a farm and in mechanical workshop;
b. summer involvement of student volunteers;
c. flash-cards on the processing and sale of mahua flower with landless and marginal farmers;
d. exhibition of working models on the theme of water, health and irrigation with farmers;
e. slide-shows on technology and employment.

Briefly, we have evaluated these experiments as follows:-

212
COMMUNITY HEALTH CELL
1st Floor, St. Marks Road

i. that it is possible to identify individual conflicts and their resolution in a whole range of activities from the repair of pumpsets to the study of the history of Baghelkhand;

ii. that it is also possible in some cases to understand the linkage between conflicts with the aid of learning aids like relief maps for demonstrating the different aspects of irrigation.

iii. that in a few instances organisational activity results when the complex of relationships is understood, as in the case of a trade bank for dealing in mahua flowers;

iv. that if the conflicts are related to one's own life, then the process of growing understanding can lead to an appreciation of the need for structural changes, as in the case of the student volunteers;

v. that if the rate of education is carried too far beyond the capacity of the learners to absorb it, then no fruitful results are likely to ensue, hence the need to match the two;

vi. and that if the form of the presentation of new knowledge does not encourage discussion, then it will not result in learning.

But these conclusions are drawn from too small a sample to permit generalisation and we are presently trying to develop a much larger educational programme.

A specific feature of this educational exercise is that we propose to:

a. translate the conflicts and interlinkages into different media of communication;

b. exhibit these media in a selected area to assess their relative effectiveness under different conditions;

c. evaluate the response of the people to correct the Demand Model.

We, thus propose to carry out what may be called PSM activity with already *existing organisations of the people* like trade unions, kisan sammelans, journalist associations, caste panchayats, unemployed youth associations, and student organisations. The evalution of PSM activity, therefore, will assess

whether these organisations have *changed qualitatively* or whether new organisations have emerged. In this manner we hope to relate theory to practice and, thus, to correct theory itself.

By sharing our experience in this Convention we hope that both theoretical and practical criticism of our work will emerge to permit us to develop further the whole conception of PSM as part of a larger movement.

MANAN NAVA CHINTA ANDOLAN AND BHARATIYA SAMYABADI SANGHA (WEST BENGAL)

To begin with, Manan-Nava Chinta Andolan (Manan New Thought Movement) was an association formed by the urban youths in Calcutta who had some experience of welfare activities in different parts of West Bengal. But they could not remain satisfied with the conventional type of welfare activities. They desired complete change of the society toward prosperity, equality and higher level of consciousness. The Manan members were determined to approach the problems of society with scientific tools. But the first question in this regard was: what is science? Because it is true, though pitiable, that in the name of science new superstitions have sprung up that demand uncritical faith to some notions claimed to be "scientific". Moreover, science is often confused with technology. A large number of educated people mean only natural science when they refer to "science". When we turn to the sphere of social activities, it requires a dynamic, integral scientific approach which it lacks. So Manan members, with their current activities of mass participation and involvement tried to solve the problem of theorisation. In other words, they found it their first duty to develop a new theoretical framework which would interpret Indian conditions from its own perspective. New interpretation of concepts like social and human progress, class, caste and their inter-relations, role of religion in Indian society etc, were let open for constructive debate. The members are cautious so that those debates need not end in futile intellectual exercises. The members feel that a synthesis between theory and practice is the need of the hour. Hence to consolidate the grass root level activities of mobilisation of mass initiative, workers' co-operatives, non-formal education etc. and agitative activities in rural areas, an organisation called Bharatiya Samyabadi Sangha has been formed to supplement Manan activities. In Manan,

young people from different districts and different walks of life come. This process got momentum when Bharatiya Samyabadi Sangha was started.

Manan has been publishing a bulletin in Bengali named "Bishleshan". It also arranges seminars, conventions and symposia on topics like class and caste and their operational definitions, problem of national integration, nuclear war and its danger, grave ecological prablems, concept of power and problems of its decentralisation, etc. In its organ "Bishleshan" it has started a campaign against nuclear warfare.

Bharatiya Samyabadi Sangha, on the other hand, has recently started a student wing to mobilise students in its programme of organising rural poor and anti-war campaign. Its members are working in rural areas of Murshidabad, Nadia and North and South 24 Parganas districts.

In their struggle for existence and expansion of their field of operation, Manan and the Sangha face numerous problems every day. They are both institutional and environmental. Regarding the instiutional problems, the problems of finance, able hands and enthusiatic workers loom large. On the other hand, the most of the institutional problems come from the vested interests in rural areas. We find that most of the institutional problems come from the socio-economic environment that includes the political and cultural influences.

To us science is a way of thinking and looking at the world. It is transferable knowledge. It supplies us with the tools of discovering the inter-relationship among the variables—social, material and otherwise. Ultimately, we are convinced that science is for man. It is the strongest weapon in the hands of oppressed people to change the society altogether. But it ceases to play its proper role in the hands of oppressors, both technologically and ideologically and again when it is interpreted mechanically by the dogmatists. Manan Nava Chinta Andolan and Bharatiya Samyabadi Sangha stress on common international identity as well as the historical and cultural specificity of India, on the basis of which it endeavours to involve the masses in the process of social change.

If we come to the question of our perception of the work, we must say that despite all our bitter experience regarding the individualistic outlook of many groups, they require to come

closer to one another. It is not only exchange of experiences and ideas—some thing more than that: Scientific outlook deserves complete of elemination of parochial and individualistic outlook. We require co-ordination of different groups who are working in the fields of natural as well as social science and whose aim is to change this society through mass initiative. This co-ordination should be done on a broad basis and at the all-India level.

AUDYOGIC JEEVAN MANCH

AUDYOGIC JEEVAN MANCH is a voluntary organisation which seeks to play a complementary role vis-a-vis workers' organisations through its cultural, educational and research activities. It focusses on the problem of dehumanisation of working life and the production process.

Its broad aim is 'Rehumanisation of the working life through increasing workers' control over various aspects of the functioning of the industry'. It recognises that a movement in this direction is possible only through workers' struggles developing in this way.

AUDYOGIC JEEVAN MANCH carries out action-oriented research studies along with the concerned workers and their unions on issues like work intensification, productivity deals, new management techniques, technological changes like automation, management strategies for behavioral control, safety and industrial deceases, etc. It also takes up activities like educational programmes, publications, surveys, documentation and cultural activities. Some of its activities have been as follows:

(i) Study of problems of lead poisoning in the paint shop of Premier Automobiles, an automobile factory in Bombay.

(ii) Preparation of a report on Computerisation in LIC. This report, prepared for the All India Insurance Employees Association, detailed the effects of computerisation and the anticipated effects of a widespread introduction of microprocessors in the various branches of the LIC throughout the country.

(iii) Developing a counterproposal to a productivity plan advanced by the management of Jaihind Industries, a non-ferrous foundry in Pune, along with the workers' union affiliated to Sarva Shramik Sanghatana. The productivity plan advanced by the management was based on 'time studies' conducted by the Pune branch of the National Productivity Council.

(iv) Discussing with the activists of Voltas and Volkart

Employees Union about the effects of introduction of Computerised Numerically Controlled machines in their factory in Bombay.

(v) Giving a series of lectures on various facets of working life at a number of factories in Pune.

(vi) Publishing two booklets in comic-strip form on (a) the problems faced by workers in the corrugated box manufacturing industry and (b) the effects of the introduction of CNC machines on working life.

(vii) Writing articles in Shramik Vichar, a Marathi daily published in Pune.

IV

BACKGROUND PAPERS

PRACTISING POLITICS AND SCIENCE

NORMAN DIAMOND

For a worker in science who recognizes the need for fundamental social change, the more familiar respects in which science is political lead to relatively limited ways of combining jobs with political activity. Many indeed choose to separate professional from political lives, working with other people after job hours and outside job roles. Others publicize political abuses in connection with science or take advantage of respected positions based on work in science to speak out on social issues. Some scientists or science workers who are radicals organize their co-workers to rearrange or diminish hierarchies in the work situation. And yet all of these approaches leave the science itself, the content of research and formulation of results, untouched. Considered in those terms, science seems to offer fulfillment mainly in ways that are apolitical. For someone who is politically committed, there are constant qualms about whether and how much even to be working on science. Some people become science dropouts to expend energy on efforts more directly political. For others who need to hold a job in science and yet are unable to reconcile science and politics, the tension may result in lessening political commitment.

There is another important political option which derives from the above discussion. It is possible to use one's scientific knowledge to oppose specialization or overcome some of its deleterious effects. Often what pass for narrow technical decisions really contain disguised political decisions which can be extricated and pointed out. *Science for the People* has been full of examples. The aura of technical expertise shelters what are political decisions from question and criticism. There is a political point too in attempting to enhance not only the scientific understanding of non-scientist but also their own ability to understand. Effective 'popularization' has negative connotations only to people who accept the elitist premises of

modern science. And yet, integrating the concepts with which scientists work for presentation to a lay audience, still accepts those concepts as given. It is through recognizing that scientific concepts themselves are political that it is primarily possible not only to be a radical and a scientist, but to be a radical scientist.

Every society rests on the consciousness of its members. Their adherence to, or at least acceptance of its structure is ultimately what holds the society together. The major obstacles we face in doing political organizing in our own society are a widespread lack of ability to conceive of a better society, or more commonly a sense that it is impossible fundamentally to change what we've got. Corporations, the state, etc., all of them clearly opponents, are obstacles primarily because too many people continue to believe them legitimate.

As a large part of this essay has attempted to show, consciousness is not autonomous. There is much about our society that encourages people's cynicism, apathy and low regard for themselves. In political organizing toward social change, it is not possible to work at the level of conciousness alone. There are severe limits on the extent to which people's sense of social alternatives and sense of their own capabilities to help shape those alternatives can be altered without some alteration in their lives. A revolutionary movement, aiming at a society in which all the people will run the society, must engage people increasingly in conscious and active participation toward changing social conditions now. This is distinct from models of revolutionary action which postulate a revolutionary elite as the sole active force, or ones which include an uncomprehending or merely sloganistic mass participation, or ones which would require waiting until after a seizure of power for the entirety of the social change. This is distinct also from any one-way conception of the relationship between social conditions and consciousness, either one that expects capitalism inevitably to fall from its own contradictions, exclusive of human effort, or one that approaches people without careful consideration of the concrete factors that shape and limit their receptivity. The very fact of being part of political struggle is itself a changed social condition which makes possible changes in perspective and attitude especially if the political struggle is well chosen and well organised.

A crucial objective of organizing is the fundamental transformation of outlook. Through their struggles, people must learn to understand our society, what maintains it and what will be required to change it. There are important answers that will elude us until we have a mass movement with the capacity to shake and test the society. People must see themselves as capable, if united, of effecting basic change and increasingly able themselves to decide which tactics will further our growing knowledge and ability to transform. It is insufficient to be only anticapitalist, anti-ruling class, anti-racist, etc. More than an abstract idea of the kind of egalitarian, genuinely democratic society toward which we aim is necessary. That society must be seen as a real prospect and legitimate objective. Unfortunately even many radicals deep down do not believe that a better society is anything more than a theoretical possibility. Their actions and the ways they work with others manifest their acceptance of the prevailing order.

Going Beyond: Doing Radical Science

Knowing that science concepts would and will be different in a qualitatively different society enables science workers in their daily practice now to call into question this society and the consciousness that sustains it. This can be done in two basic ways. The first is by learning to identify the hidden, seemingly commonsensical and thus hard to see, premises that underlie accepted concepts, and by learning to recognize how these premises reflect a world-view which is socially based and socially restricted. Showing their connection to the structure of our society, teaching others to understand all ideas and cultural products in social terms, aids people in recognizing that this society is not eternal and cannot be simply accepted as given.

This first possibility for political practice within science leads to a second. Having discerned the kinds of premises and perspectives promoted by the life in the society, radical scientists may begin to be able to develop alternative science concepts based on empathy with a qualitatively better society; to attempt the new possibilties for organizing data which arise out of a different world-view. The difficuities in undertaking this science/political option are formidable. Now it requires identifying with a society not yet existent. We are of course fortunate in the availability of

socialist societies to present us with alternative models. These can serve, however, to indicate only the barest outlines, the most abstract hopes, for what we could create here. Undoubtedly it is impossible to put oneself entirely outside of one's society. To step back from it, to delegitimatize it at its roots within oneself and others is immensely difficult. Yet this is a fundamental goal of radical practice and the precondition of radical science.

A word is necessary regarding validity in science. Concepts are not arbitrary, nor are they plastic. There is an external reality to which they must correspond. Most of the concepts in present day science have a definite operational validity (this is not the place to explore other possible tests for validity); they are not, however, the exclusive ways to organise data. Modern science recognizes the tentativeness and incompleteness of any particular concept, the possibility that it will be transformed through further discovery. What is not readily acknowledged is that its supersession, at the level of fundamental conceptual change, is tied to social developments. In addition, scientific concepts are partial not only because they correspond to a particular social structure, as we have seen, but also because most scientists, as a relatively privileged social group, have a stake in only a partial view of their social reality. The world-view which the concepts manifest is thus that of a group barred from an over-all perspective. As partial, the present-day science have been functional both in controlling natural reality (the operational test) and is not questioning social reality.

To the extent to which it is possible to transcend the dominant world-views based on adaptation to this society, alternative science concepts may be developed now, resulting in a more creative science. This in itself, however, is not a political accomplishment. Without making explicit the political underpinnings, the alternative concepts will become simply creative reinforcements for the status quo. Radical scientists need to be self-conscious of and to show others how their concepts arise, how their ideas relate to their society and how to understand their society. Alternative concepts should be used to raise social alternatives. In science, as elsewhere, the theoretical possiblity and attainability of a qualitatively better society must be constantly stressed.

There has been a tendency among radicals to reject the usual posing of issues in terms of scientist's personal or social responsibility, and rightly so. Abuses of science are endemic to an oppressive social order. There is, however, a higher level of individual responsibility which comes with the awareness that concepts do not automatically derive from raw data and are socially influenced. Recognizing that there are choices behind concepts and that these choices have political implications, radical scientists are able to take responsibility for the concepts they use. By doing so they act as precursors of a society in which consciousness is no longer subordinate to social conditions. Through their science now, they can contribute to fundamental social change.

This essay has gone nearly as far as it can. The next step would have to start on social analysis and restructuring of current science concepts. This should be read as a challenge to politically committed science workers to undertake that effort.

(Excerpt from Norman Diamond "Politics of Scientific Conceptualization" in Les Levidon and Bob Young (eds.), *Science & Technology and the Labour Process*, Marxist Studies, Vol. 1, 1981, CSE Books.

ENVIRONMENT AND DEVELOPMENT IN INDIA

K. P. KANNAN
ASHOKA MODY

The ideology of development as it emerged in the wake of the Second World War and the independence of several Third World nations embodied a belief in the acceleration of growth through increased capital accumulation and active public intervention. Many have sought to discredit this ideology. In particular, the preoccupation with growth has often been attacked. However, alternative schemes stressing improvement in the quality of life (life expectancy and literacy) and provision of "basic needs" have, at best, been footnotes to a continuing emphasis on growth. This has meant that a high and increasing proportion of national product has been going into investment. In a number of low and middle income countries the share of investment is now in the region of one-third. In India the proportion is one-fourth, and the Sixth Plan aims to step it up. In contrast, the presently developed countries achieved their early growth and structural change at investment rates in the range of 10 to 15 per cent. Undoubtedly, therefore, development pressure today is much higher than it ever was: the attempt is to compress more and more growth into less and less time.

It is hardly surprising that such high pressure development should have a deleterious impact on the environment. According to *The Global 2000 Report*[1], the rate of environmental degradation in the less developed countries (LDCs) is much higher and is likely to have more far reaching effects than in the developed countries. The developed countries have maintained their environmental balance relatively well through significant reliance on developing countries for natural resources, a longer drawn out development process, earlier environmental awareness and greater resources for counteracting environmental damage. For example, the estimates of *The Global 2000 Report* show that

forest cover in LDCs will decline by 40 per cent between 1978 and 2000, whereas the decline over the same period in the industrialised regions of Europe, USSR, North America, Japan, Australia and New Zealand will be only 0.5 per cent.[2]

There have been few attempts at taking an integrated look at the Indian environmet. The "Citizens' Report" on *The State of India's Environment* is therefore very welcome.[3] The *Report* is planned as the first of an annual series which will provide a continuing assessment on environmental issues.

Unlike most writing on exhaustible resources and the environment, this *Report* is not about the future, the 21st century or a doomsday. It is, as the title says, a commentary on the current *state* of India's environment in the context of the basic problem of poverty. It is the first attempt of its kind in India wherein at the initiative of the Centre for Science and Environment, New Delhi, a number of non-governmental organisations cooperated in generating the required information. The CSE, which prepared the *Report* in its final form, is a non-profit, non-government, quasi-academic research organisation set up to "increase public awareness of the role of science and technology in national development". The *Report* catalogues a grim list of on-going environmental degradation. By tracing the links between the different forms of environmental degradation, the *Report* demonstrates that the individual instances of degradation add up to very much more than a simple sum. The authors of the *Report* trace the degradation to a wide range of "developmental" activities. The *Report* thus is a severe indictment on the economic and social development strategy being followed and brings out into particularly sharp focus the complete absence of a holistic understanding and approach to developmental problems facing the country.

To understand the totality of the environmental degradation caused in India, as summed up in the *Citizens' Report*, it is useful to consider first the interactions between environment and development. These interactions are complex. They must ultimately be assessed in terms of their impact on human conditions. Firstly, changes in the physical environment have a severely damaging effect on vulnerable groups because, more often than not, their interests are overlooked when development projects are designed and implemented.

Secondly, damage to the physical environment is only one part of environmental degradation. There is a continual degradation of the human environment which is independent of physical environmental damage. However, degradation of the human environment, whether mediated through physical environmental degradation or not, has its own feedback effect on continuance and enlargement of human suffering.

Hence, the two important sources of environmental degradation which have an impact on human conditions may be identified as: (i) misplaced investment priorities, such as neglect of housing, sanitation, cooking energy, health etc; such neglect, it should not be difficult to appreciate, is a straight forward reflection of the limited political clout of the weaker sections and impinges on them directly; (ii) ill conceived though well meaning development activities leading to deforestation, water logging, soil erosion etc; such development projects, while adversely affecting the weaker sections, also constrain long-term sustainable development and thereby affect all sections. Consideration of environmental issues in development therefore highlights two sets of conflicts. On the one hand, there is the conflict between different social groups and on the other hand between growth and consumption in the short-term and sustainability in the long-term.

These considerations are often trivialised even by perceptive social scientists. That they are not at all marginal but indeed of a frightening dimension has been forcefully brought out in the *Report*. In a chapter entitled "People", the *Report* highlights the environmental impact of growth and the consequent marginalisation of vast numbers of population. What the destruction of forests did to India's 44 millon tribals, and mechanised fishing to the traditional livelihood of more than 6 million fishermen is relatively well known. Less known is the plight of 40 million pastoral nomads: "The rapid conversion of pasture lands into farms has robbed them of their resource-base, greatly impoverishing them in the process. Many millions have already become landless labourers".[4]

Women have been another vulnerable group bearing the brunt of environmental degradation and the *Report* has rightly focussed on the problems they face. The plight of women reflects human environmental degradation mediated through

physical environmental damage as well as neglect of "basic needs" in investment priorities. Scarcity of domestic fuel and drinking water means increasing burden of the women folk who spend a significant portion of their time walking long distances for collecting fuel and water. Problems such as lack of access to latrines has put them in an extremely desperate situation as they try to fulfil these basic necessities of human existence. The brave attempt of the women of Chamoli in northern UP towards preventing the indiscriminate felling of their forests by the forest department and contractors has now evolved into a movement giving them a new found strength to face up to the attack of the vested interests. It has also highlighted the failure of the so called development policies in recognising and taking care of the requirements of women.

Further examples of direct human environmental degradation have also been brought out in the *Report*. Despite growth, rural infant mortality has shown no tendency to fall during the 1970s, and in 1978 was still above 130 deaths for thousand infants born. Housing and water continue to be grossly inadequate, to say the least. The backlog of urban housing during the last decade has grown from 2.9 million to 4.8 million. One of the consequences of this to the human environment can be guaged from the fact that there is no access to latrines of any kind to over 50 million people, i.e. a third of the urban population. Pronouncements on social justice by politicians notwithstandig, there is no place for rural housing in any of the development plans. On the contrary, the available cheaper house building resources are taken away for consumption by the rich. For example, in rural Karnataka bamboo, once almost a free good, sells at Rs. 1200 per ton, while the government supplies bamboo to the paper industry at Rs. 15 per ton. As for safe drinking water, 70 per cent of the population has simply no means of getting it.

Rapid population growth is often regarded by influential groups and agencies, both at the national and international levels, as the major cause of environmental deterioration in developing countries. The above description of marginalisation of large numbers (who do not have a significant asset base) shows that the link between population growth and environmental degradation is extremely tenuous. As is well known, the

industrialised nations with 20 per cent of the world's population use 80 per cent of the world's resources. Within India also, the use of resources is extremely unequal and is becoming more so over time. A small minority command the bulk of the resources and by virtue of that do the bulk of the environmental damage. Most environmental problems can be traced to the consumption pattern of the rich.

The other theme that emerges from the *Report* is that given the technology currently in use, continued emphasis on growth will, through environmental degradation, very soon lead to severe constraints on further increases in production. Agriculture is the sector likely to be most seriously affected[5]. The destruction of forest cover and the construction of multipurpose dams lead to soil erosion, loss of soil nutrients, greater volatality in the movement of water, soil salinity, breeding of diseases, etc.

In is instructive, for example, to note that even after spending a massive amount of Rs. 7510 crores on major medium irrigation since independence, the productivity of irrigated lands is only 1.7 ton as against the targeted figure of 3 to 4 tons. In its Sixth Plan the Planning Commission has admitted that "the huge investments made in irrigation have yielded disappointingly low returns in terms of yield as well as finance". One of the major problems in these dams has been the rate at which siltation has been taking place. Observed siltation rates are three to four (sometimes even more) times higher than the projected rates. In the Tungabhadra river valley project the observed rate of siltation has been 41,058 acre feet per annum as against a projected rate of 9796 acre feet while the Ukai project in Gujarat has registered 21,758 acae feet of siltation as against a projected rate of 7,448 acre feet. Again, despite a national flood control programme launched in 1954 the area affected by floods and the economic damage caused increased "sharply and consistently" in the last three decades.

At a mere technical level one can list a number of faults. Development projects when they reach the level of implementation are mere construction works looked upon as feats of engineering skill. Other factors (whether agroclimatic or socio-economic) do not get any closer scrutiny. But these are not the real issues. The implication from a long term view of development is that the current technology needs to be changed or

seriously modified, and also that environmental issuses have to be made an integral part of national social and economic planning.

Technology change is, of course, no easy job. Technology choice and development has been geared to needs and preferences which reflect the extremely unequal asset distribution. Moreover, technology change is likely to meet strong resistance at the level of implementation. The source of this resistance should not be difficult to identity. In practice, the actual executioners of all public projects are the contractors who have no special reason to worry about environmental or socio-economic consequences of their actions. In their pursuit for quick and easy money, they are not concerned beyond creating construction activities (which may have nothing to do with the priorities of economic development). In doing so, there may well be deforestion of an area (though it may have been given at for selective felling), or construction which is far below the "specifications", leading to calamities and vast destruction. But all these cannot be done without the tacit support of officials and politicians. Therefore a firm and lasting network which is mutually beneficial is created. This collusive set up is a fairly established and accepted institutional mechanism of "development" activities in this country.

Thus viewed, it is not difficult to understand that as far as planning for the environment is concerned, the Indian record has been poor. Though environmental concerns have been voiced in the five year plans, these concerns do not get integrated into specific planning decisions on final consumption basket, investment allocation, time preference between current and future consumption and comprehensive social cost benefit analysis.

Since the official response to urgent environmental demands has been poor, the cause of the environment has by and large been taken up by non-government, voluntary agencies. The *Report* has done well to highlight the activities of these voluntary groups which diverge in their focus and level of activity. Though the combined numerical strength of these voluntary groups is still very limited, the commitment and the zeal with which they have acted in their immediate social context does evoke high praise. The initiatives include activities such as the construction of public baths and toilets in Patna by Sulabh International, women's movement in Uttarakhand (by now well known as the

Chipko movement) against the indiscriminate felling of trees, Kerala Sastra Sahitya Parishat's crusade against the Silent Valley project and the pollution of Chaliar river in Calicut, the Save the Soil campaigan in Madhya Pradesh and the campaign against the forest bill by NGOs. While it is heartening to note the initiatives and activities of the NGOs, a question does arise as to the role of the many mass organisations in the country such as political parties and trade unions. Why is it that the people's hardaships as revealed through environmental degradation do not provide an opportunity for these organisations to mobilise them against a development strategy that is becoming increasingly detrimental to the poor majority? Why do some among them lend to treat environmental issues as trivialities? What is the ideological block that separates their slogans for social transformation from environmental degradations taking place in the country? This lack of enthusiasm and response to new problems, in a sense, also explains the insensitivity of the political parties and similar mass organisations to perceive the complexity of social change taking place through "developmental" activities.

The difficult questions regarding environmental planning need to be faced squarely. By highlighting the dimensions and rate of environmental degradation, the *Citizen's Report* has performed a valuable service. In the coming years, it will be necessary to explore ways of providing a higher qualiy of life to those outside the mainstream of current development activities while preserving at the same time the balance of the physical environment. It is hoped that specific questions thus arising will be dealt with in detail so that the annual assessment contributes to a continuing debate.

Notes

1 Gerald O Barney (ed) *The Global 2000 Report to the President of the US*, Volume I, (Pergamon Press, New York. 1980)

2 *ibid* pp 23,26

3 *The State of India's Environment 1982-A Citizen's Report* (Centre for Science and Environment, New Delhi, 1982.) Though one of us was involved in the original conception of the *Citize'ns Report*, the overall responsibility and credit for bringing it in the present form should go to the team at the Centre for Science and Environment, New Delhi.

4 *ibid* p 114,

5 See also *The Global 2000 Report, op. cit* p 32,

ENVIRONMENT AND DEVELOPMENT: KSSP'S APPROACH

M.K. PRASAD

KSSP's involvement in environmental issues began in the early half of the seventies when some of our activists took part in investigating the pollution problems in and around Cochin. They became members of Working Group on Environmental Pollution sponsored by the Cochin Science Association. In fact this happened years before the first Stockholm Conference in 1972. The group made preliminary surveys on air, water and land pollution, assessed damages already caused and worked towards creating public awareness as a possible means of demanding arrest of worsening of the environmental status of Cochin area. The Cochin Science Association and KSSP jointly sponsored a seminar in 1972 on Environmental Pollution, which was perhaps the first of its kind in this part of our country. One of the recommendations of the seminar was to establish a department for environmental studies at the then newly started University of Cochin.

The Seminar did have immediate feedback. People from various corners of the Cochin region started reporting to our activists local issues of air and water pollution. Pollution by a threadmill at Koratty, fecal pollution of fish landing areas in coastal areas, sea erosion cases, large scale fish kill etc. were brought to our notice.

During the second half of the seventies, KSSP was gradually getting involved in environmental issues. A debate, strictly within the organisation, was going on on the Silent Valley and the proposed hydroelectric project in the area. KSSP workers were debating the pros and cons of this project, its relevance to the energy situation in Kerala and the KSSP's own stand on the issue. While this debate was going on, the Kottayam District Committee of the KSSP put forward a request saying that a study of the ecological and other problems in Kuttanad be carried out because some people from Kuttanad have been

asking the KSSP workers to come and study their problems. In response to this request, a Study Team of the KSSP visited Kuttanad for a week. The report of the Study Team was discussed in the annual conference of the KSSP held in Kottayam in 1978. The results of this study brought to KSSP the hardships of the people as a result of ill-conceived and ill-implemented water control projects in a densely populated area like Kuttanad.

The debate on Silent Valley Project was becoming controversial during 1978. KSSP was asked to announce its position. This resulted in the constitution of a Study Team and the publication of KSSP's report on the Silent Valley Project.

By this time KSSP had already established its Environment and Health Brigade (1977) charged with the duties of making studies on environmental and health problems and also to co-ordinate mass education programmes on environmental issues. That was a time when villagers of the Chaliyar river basin were voicing their protest against the Gwalior Rayons factory which threatened their lives by severe pollution of the water and air. KSSP got involved in this and a team of experts soon made a study of the problem and eventually brought to light an economically feasible solution. Simultaneous with these studies KSSP strengthened its programme of non-formal education by introducing the now famous Kala Jatha using the folk art medium, exhibition, way-side meeting, slideshows, demonstration, etc., KSSP realised that unless the common man knows what is to be conserved and why it should be conserved he will not help in conserving nature.

Today man is capable of destroying himself and every vestige of life from the face of the earth. This he can bring about abruptly through a nuclear holocast, or gradually by degrading and destroying his environment. It is already known that many species have disppeared from the earth either due to over population or through destruction of habitat. They were subjected to the blind action of the laws of nature. But man can comprehend these laws and make use of them for his sustenance, expansion and well-being. He has also got a fairly good knowledge of the laws of his own social evolution and today he is in a position to create his own history. But what he does not realise is that all his efforts to modify nature are short-sighted endeavours.

Upto very recent times, i. e. the end of the 19th century, man's control over the forces of nature was very limited and so his doings could not affect his environment significantly. But today this is not the case. Man can and has been making significant changes in nature. The present day experience is that man tends to act like the proverbial person who kills the goose that lays the golden egg, and by destroying the capital of our resources at an alarming rate.

Man has to produce food and other materials required for his sustenance. Agriculture means protection of one or more selected plants and destruction of all the rest. This itself has resulted in the breaking up of several biological cycles. But more damaging was the hill-slope farming operations, stemmed from total ecological illiteracy, as well as the invasion of fertilizer-pesticide technology. Industrialisation and urbanisation led to further environmental ills.

A question naturally arises: Are all these activities done deliberately? Mankind has a better understanding of nature's laws and perceives both the more immediate and the more remote consequences of his interference with the traditional course of nature. But this remains as academic knowledge. Knowledge alone is not sufficient. To understand this we have to investigate not only the changes in biophysical environment but also his socio-economic environment. It is this socio-economic environment that determines man's interaction with the bio-physical environment and in turn is modulated by his cultural environment.

Man interacts with and brings changes in the environment primarily to eke out his sustenance. Having endowed with these facilities which we call human, he did this in a conscious, collective way. Man has to satisfy his cultural requirements too. This culture grew out of the special way in which man extracted his livelihood from nature. This cultural hunger, in its widest sense, is perhaps manifesting in the ever growing hunger for consuming nature's resources at an alarming rate. But unfortunately exponentially increasing utilization of any resources will deplete them sooner or later. The fact remains that many of the resources on which we depend today are non-renewable.

The difference between academic knowledge from life's

experience is very well reflected in the basic difference between the crusade against the Silent Valley Project and the struggle against pollution in Chaliyar. The Chaliyar struggle is a real people's struggle which was not the case in Silent Valley crusade in the sense of the involvement and participation of the people in the affected area. In the Chaliyar river basin the villagers were subjected to all kinds of misery. The foul air that belched out from the chimneys of Mavoor Rayons factory destroyed the natural vegetation and the crops of the nearby villages of Vazhakad. The sulphur dioxide made the people chronically affected by respiratory diseases. The partly treated effluents poisoned the river and consequently people were deprived of water for drinking, bathing, washing and irrigation. There was considerable loss of labour opportunities, and the local economy was paralised. People of the area started agitation. They knew that the factory was responsible for all their ills. But they also knew that the factory was essential for their economy. So the agitation was not broadbased. It was at this juncture that KSSP entered the scene. We knew that pollution was not an essential evil. There exist technologies to abate pollution. The KSSP's expert team made a thorough study of the whole issue, identified the pollution sources, estimated the qualities, surveyed the damages to the health and economy of the people and brought to light the best possible solutions for the malady. People were informed of these and this doubly strengthened the hand of the agitators and the struggle took entirely different dimensions. It became a total people's struggle and it still continues, crippling the tactics of the management.

Silent Valley crusade has a different story. It was never started as a people's agitation in the sense of Chaliyar. A few activists of the KSSP became concerned about a concerted move made by the Kerala State Electricity Board, through newspapers, as to create public pressure on the Government of India to sanction a hydel project at Silent Valley. Investigating into the reasons behind this, our men came to know that sanction for the project was withheld on environmental reasons. This led them to make a serious study of the whole issue. But by then the propagandists for the project had made local people clamour for the project saying that it is the only panacea for northern

Kerala's power crisis, and which would create more job opportunities besides large scale irrigation facilities in the comparatively backward districts of Malappuram and Palghat. Thus the controversy turned out to be, as some people and sections made it, a case of "environment versus development". A techno-economic and socio-political assessment of the project was made by a Study Team of the KSSP acknowledged that, for the people of Malabar, their needs of energy, irrigation and employment are more real than the necessity of protecting the Silent Valley forests. But it was pointed out by KSSP that the total demand for electricity in Kerala by 1990-91 will be about 7,730 million kwh to which the Silent Valley Project, when and if completed, will contribute only 522 million kwh or a mere 7%. So from the point of the overall energy position either of Kerala or of the southern grid, in the short as well as in the long term point of view, the Silent Valley Project is only marginally significant. These findings were only reiterated by all the expert studies made by competent authorities in the field and by the studies made by Government of India's own technical experts. The controversy became a national and international issue and the Government of India was forced to reconsider the proposal. Consequently the Silent Valley was declared as a National Park. But even now people at large in the concerned districts are not involved in the campaign for preserving the valley for posterity. Why? People are not satisfied or convinced by the knowledge of something which they have not experienced, but knowledge that is the result of deductions from experiences elsewhere. This requires long term education to create sufficient awareness in such matters. The role of groups like KSSP is precisely this, i e, of 'conscientising' people of the likely consequences of various human interventions, and reduce the 'gap' between understanding from one's own experience and understanding from knowledge based on experience elsewhere.

As far as the KSSP was concerned there is no doubt on the relationship between environment and development. It does not pose the issue as Environment Vs Development. For KSSP the need for development understood in our context of enabling the majority of our poor people to come out of their sub-human conditions in the economic, social, political and cultural sphere, is a real thing and something for which all of us must strive for.

In this pursuit, both the human and biophysical dimensions of our environment has to be taken into account. There is no compromise on pollution which cripples the lives of a vast number of poor people but which generates a few thousand employment. 'Pollution' is not a 'price' to be paid for more employment or income. In the same way, drinking water, sanitation and housing have to be provided for before we talk of prestigious projects and programmes.

There is however need for identifying priority issues on environment through which we could think and act so that the issues are posed in the larger perspective of development of the people. The issues will have to be discussed by people and they should be enabled to participate in the debates. In sum, generation of informed social criticism on issues which affect the people is a task that has to be taken up by all concerned groups 'Science' could be used as a 'weapon' in this social activism.

REFORM OF THE GENERAL EDUCATION SYSTEM: A TENTATIVE PROPOSAL

M. P. PARAMESWARAN

Introduction

There is nobody who is satisfied with the present system of education but today there is no universal agreement on what should be the change.

The main criticisms about education in our country are:

1. It does not give the student what it is intended to give.
2. Instead of helping the process of production it alienates students from productive labour.
3. It doesn't have a proper curriculum, but only a number of subjects to be taught.
4. Teaching methods destroy every trace of initiative in the student and stunt his development.
5. Examinations have become sieves designed to accentuate the differentiation of the society into rich and poor.
6. Most of the schools don't even have the minimum required facilities like furniture and black boards, not to speak of a library and a laboratory.
7. The entire system, right form the primary level, has been geared for university education,
8. Instead of helping a society in transition, it opposes such a transition. Most of the educational institutions function more like commercial ventures than as centres for nation building.

Even those who agree on all these points often lament that nothnig can be done under the present socio-economic set up. They would argue that the first thing we have to do is to change the society. But education is one of the tools, and a very important one at that, for changing the society. We should therefore examine the means to use the present day education

itself, its structure. contents, teachers, schools, etc. to change itself and the society.

The Concept and Relevance of Education

Let us ask ourselves: What is education? Why education? For whom education?

Education is, in our view, a conscious process of bringing up the new born child and imparting it the necessary knowledge and training so as to enable it to become a useful member of the society.

This at once should reveal also the purpose of education. The purpose of education is to develop the personality of the individual to the fullest extent so that (a) he/she should be able to discharge effectively and efficiently the functions entrusted to him by the society and to contribute to the onward march of the society and humanity, (b) he/she should be able to appreciate the cultural heritage of the society and humanity at large and (c) he/she should be able to resist and defeat forces which come in the way of the realization of the above two objectives.
There is an old Sanskrit *sloka* on education which is valid even now. It says that the pupil learns one quarter from the teacher, another quarter from his classmates, third quarter by himself. The last quarter, only time and experience can teach him. The function of formal teaching by the teacher is to help the student learn by himself through the other three means.

Education for whom? One may say, 'for all'. But we all know that this is untrue. Even today more than sixty pecent of our people above five years of age are illiterate and they are the poorest people also. Definitely education has not been addressed to the poor. When we look into higher education the bias against the poor is much more evident.

Society and Curriculum

What are the functions that will be entrusted to the individual by the society? Of course, 'society' here refers to our society only. Depending on the nature of socio-economic activity we might classify educational requirements in different stages.

Stage one: Here the group of activities needs the minimum amount of formal education without any specialization. The

general schooling would be universal for seven years, though a good number may proceed for secondary education. The activities for which the general schooling should cater to would be:

(a) Primary sector: Agriculture, animal husbandry, fishing and forestry.
(b) Secondary sector: Traditional industries and small scale and cottage industries.
(c) Tertiary sector: All categories requiring manual work.

Stage two: The jobs in this group require at least two to three years specialised training after a minimum general education of seven years.

Trades connected with construction work like carpentary, masonry, concrete work, painting, plumbing etc; workshop trades like welding, turning, fitting, etc. as well as trades like garment making, printing, jewellary, smithy, etc. are included here.

Stage three: This group requires minimum of ten years of general education and further on job training. These are jobs that demand a university degree today. There my be some jobs which require special education for a period of three to four years after ten years of general shooling. Many of the clerical, supervisory and technical jobs could be included here.

Stage four: Jobs in this group require higher academic qualification. Teachers (school and college), research workers, doctors, lawyers, engineers, scientists, auditors, etc. come under this.

Nearly 80 per cent of the work force in India are employed in the primary and secondary sectors and they contribute no less a percentage to our national product. Of this nearly half come from agriculture proper. People employed in these sectors get only primary education or no education. No curriculum has been darwn up for this section of the people, taking into account the various demands that will be put on them. If one goes through the pages of the primary school text books this become evident. They are not prepared in accordance with the declared social objectives. They are conceived only as steps in the ladder to universty education. Considering both the 'cultural' and 'functional' aspects of education we have made an attempt

to formulate a curriculum for primary education in India and compare it with what is given in exisiting textbooks (we have no guarantee that it is being actually taught). While preparing such a curriculum we had to decide whether the seven year primary school is a terminal stage of education or only the first stage in secondary education. Under the prevailling cirumstances and what we can foresee in the coming few decades we have considered universal ten year schooling unreal. We consider that seven years schooling should have a rounded off curriculum, because at least twenty to twenty-five percent will get dropped in that stage and of the remaining at least half would have to be diverted to vocational schools.

For university education there should be some kind of a meaningful 'selection'. The present modes of restriction and selection are open to criticism and they do not provide a fair chance to all deserving students.

Primary School Curriculum

The social functions falling under the first stage can be carried out, generally, with the help of aseven-year primary education, though at the turning point of the century to become 'cultured' one may require at least ten years of formal schooling (fifteen years of age, to be more precise). The curricular requirments according to us, are given in the left hand column of the table. What is offered through text books is given on the opposite side.

What is required	What is offered
LANGUAGE	
Should be able to understand, speak, and write clearly, effectively and without mistakes. Language is a functional tool. Grammar should be taught for this purpose. Language is, also, an important vehicle of culture. Texts should reflect the cultural progress of humanity in general and that of our people in particular.	The emphasis is on examination rather than on functional ability. Many remain literally and functionally illiterate even after seven years of schooling. Selections give a skewed picture of world and Indian cultures. The idea of cultural progress and dynamism is discounted.

What is required	What is offered
NATURAL SCIENCE	
This is more cultural than functional—over-all picture of the objective universe around us, living, non-living, micro-macro aspects, constant changes, universal interconnection and diversity, evolution etc. One should obtain a scientific world outlook. Similarly atomic energy, space travel and electronics are fast becoming cultural elements in every man's life. They should not sound strange.	Primary general science books give some idea of life, air, water, nutrition, earth etc. But one can see no attempt consciously to build up a scientific outlook.
SOCIAL SCIENCES	
Origin and evolution of life, society and social systems, its elements and changes, social organization, rights and responsibilities. History of the State, India, and Mankind, economic and cultural geography, economic life of people; agriculture, soil types—soil conservation, agro—climatic zones, crop suitability, land relations, cost of production, price fixation, industries of the State, raw materials, labour laws and organizations; legislative, judiciary and the administrative system.	Our earth, earth's surface, atmosphere, hydrosphere, lithosphere, structure. Exploration of Asia, Africa, New Zealand and Australia, Europe, America. India: boundaries, neighbours, physical regions, natural resources, people, etc. Our history and heritage, some great people. India's independence movement, national festivals and symbols; Ancient India, medieval India, modern India, independence struggle of 1857, from 1857 to 1947. Problems of Independent India, of our National Government, democracy, state governments, India and other countries.
BIOLOGY	
Plants and animals—living and non-living—life history of plants— favourable and unfavourable circumstances–heredity—hybrids—botany of	Observation of nature,plant, cell, parts of a flower, plant-cell, root, stem, leaves,flower, pollination, fruits, germination, plant growth, plant

What is required	What is offered
important crops-interrelations photosynthesis important domesticated animals–diseases–reproduction—pests, their life cycle.	metabolism, useful plants, animal diversity, animal cell, mammals, reptiles, amphibious, fishes. insects, worms.
HUMAN BODY	
Health and disease, food and nutrition, water, air environment, cleanliness, interrelations, prevention of diseases, cure. Human body, physical and functional organization, occupational diseases and prevention.	Human body, external shape, internal organs, organs of locomotion, food and digestion, food habits, circulation, waste removal, nervous system, sense organs, health care and first aid.
CHEMISTRY	
Matter—element – compounds —molecules atoms—chemical and physical changes–drying, decay, processing, preservation—acids, alkalies, salts, pH, pH of soils, its chemical structure, crops and pH, fertilizers and manures, manufacture of chemical fertilizers application, micro nutrients, pesticides, their toxicity.	Chemistry in daily life—matter, three states, pure substance, mixture, elements and compounds, properties, melting and boiling points—chemical change, catalyst, purification, air and oxygen, manufacture of oxygen. Hydrogen manufacture, properties—water, constituents—pure water—acid, base, salt—carbon and its compounds, fuels—molecular structure of matter—language of chemistry.
PHYSICS	
Micro and macrouniverse—mass, space, and time—necessity of measurement—pressure—force — energy — heat, temperature atmospheric pressure—barometer — operation of pumps—motor, electricity –fusewire—flow of fluids, hydrostatics—diffusion— capillarity — simple machines—density measurements—lactometer—humidity measurem-	What is physics—measurements—length and volume; instruments, force, distribution of pressure, molecular structure —vacuum— motion, expansion, temperature—properties of fluids, atmosphere, barometer, pump; bouyancy. Motion of objects, relative motion, translatory and rotatory motion, inertia, mass, work and energy, simple

What is required	What is offered
ent, heat—expansion — conduction convection-radiation, black and bright surfaces—light reflection, refraction, mirrors, spectacles—eye.	machines, sound. Heat energy—change of state — light velocity—transperency, reflection—mirrors, prisms and lenses, eye—colour — instruments, electricity — cells—current —heating, magnetism & electricity—poles — induction, geomagnetism—electromagnetism—instruments.
MATHEMATICS	
Four operations with whole numbers and fractions. Interest, profit, loss, average, ratio and proportion—accounting, banking. (These are the basic achievements requirements — But modern life demands certain mental capabilties of observation, generalization etc, algebra is an important tool for that) Algebra—algebraic sentences–number line—segments.	4 digit numbers—4 operations with 3-4 digit numbers—number line — fractions—decimals, time—pictograph—patterns, factors and multiples —fractions, decimals, tables algebraic sentences -- basic concepts of geometry—segment—perpendiculars—drawing to plan–area–percentage, simple interest, volume — average — integers — average variables —equations—circle, angle perpendiculars and parallels—geometrical figures —share—compound interest –proportion–symbols–indices —square and square root—graph, angle, triangles, circles.
SKILLS	
Preservation of different metals—properties-bonding—domestic appliances — iron tools; science clubs—nature clubs — tool clubs; singing, drawing, writting activity; sports—importance of collective participation. Methods of science—theory and practice, generalization and abstraction—the universality of science.	Practically nothing except some sports and games.

General Education and Universal Education

Today each stage is considered as a stepping stone to the next stage. Only after a degree one feels a terminal stage. Any one who discontinues in between, and the majority do so, gets only incomplete education.

From primary to high school we impart general education. Only in ITI's, Junior Technical Schools and Polytechnics we give vocational education. Though our declared objective is compulsory universal education (universal for all in the respective age groups) upto 10th class we are nowhere near that. 10th class means 15 years of age and nobody will say that children below this age group should be asked to work for wages. However, 10 years universal education is almost beyond imagination for years to come in the Indian context. Even in Kerala about 30% get dropped by eighth standard. Further, all the rest go for general education, only because no proper avenues of vocational education exist. Admissions for ITIs is almost as tough as for professional colleges. Competition is very severe. But the fact is that we are not training even one fourth the required number of technicians, a good many of whom can be diverted from primary stage itself. Hence seven year primary education will have to be planned as the first terminal stage and should have a terminal point. Nearly half of the work force will be, under the existing circumstances, satisfied with primary education.

What about S S L C? Is that to be considered as another terminal stage? Then what is pre-degree? If pre-degree is not a terminal stage in itself, but only a feeding stage for degree course, the intake should be limited accordingly to have enough to supply for degree courses. To argue that all who pass S S L C should be provided with facilities for pre-degree means that all of them should be provided for upto graduate or even post-graduate education. This is both meaningless and impossible. The higher secondary is conceived as a terminal stage. In that case admission to 11th from 10th class will be as automatic as from 9th to 10th class. However, pre-degree is not conceived that way. Hence, for the present we will consider S S L C as the last stage in general education. It means that there will be some form of restriction for higher education. To what extent and in what manner, one has to discuss separately.

Pre-degree admission is governed by degree requirements. Today majority of the administrative jobs requiring degree do not, in fact, require education upto the degree stage. For administrative and non-technical posts, S S L C may be taken as sufficient. However, there is one job today demanding a higher level of qualification—that of primary teachers. Teachers should be trained in pedagogical institutes, on par with other professional institutions—four years course after pre-degree.

Teaching and Examination

Examination is a teaching aid; it helps the teacher to assess the student's progress, helps the student to identify his weaknesses and helps them both to collectively solve the Problems. This has remained only as a beautiful thesis never worked out in practice. Teaching has been, in practice, the art of forcing quinine into the mouth of the student; examination has become the act of spitting this out. Examinations should not become memory tests for weeding out the majority. Class tests, sessional work etc, are introduced in some institutions for this purpose. But they have not succeeded, because the student and the teacher view each other with suspicion. Obviously a piecemeal approach to the problem cannot bring about any meaningful result. Examination reform can be only part of an overall plan. The following suggestions are put forward as a part of the foregoing proposals on the content and structure of education.

1. Examination as aid to teaching is to be separated from examination for sieving and selection.
2. Examinations of the first type are to be done at the institution level.
3. Written answer papers are to be given back to the students. This will help them to understand their mistakes, as well as to make an appeal if the teacher has been patently unfair.
4. Oral examinations are always to be conducted by three persons, one of whom shall be the teacher of the student.
5. There should be terminal examinations at the end of primary, secondary, pre-degree and degree level. There shall not be any grading in these examinations, or at the most an A-B-C grading. These examinations are

not to be used for comparison or selection, but only as eligibility certificates for the next stage of education or job.

6. There shall be entrance examinations to all courses after S S L C—Polytechnics, Pre-Degree and Degree. The corresponding institutions or their boards of studies would conduct these examinations.
7. There should be academic councils at school, educational sub-district, educational district and state level. (The last one is similar to the S S L C board) This should consist of teachers and non-teaching academicians.
8. The final examination at each stage should consist of both written and oral tests and should be conducted by duly constituted local bodies.
9. The present system of grouping for pre-degree is meaningless. Students should be able to take, besides languages, a minimum three courses from Maths, Physics, Chemistry, Biology, History, Economics, Commerce etc. They can take more than three optional courses.
10. Mobility from stream to stream is to be ensured by providing short-term courses to make the required credits. For example, a student who had gone through three year vocational training, can be brought on par with S S L C by teaching the necessary additional subjects. From any vocational course there should be provision to switch back to the general education stream.

Problems

Such drastic changes in curriculam, structure and examination methods may be considered as totally impracticable. Partial implementation will create more problems than today. We think that the total framework is a self-consistent one. But to carry out such a change it will require full understanding and cooperation of the four sections of people involved in this i. e., the students, the teachers, the parents and the non-teaching staff and officials. We have tried to allay the apprehensions of students about internal examination, namely victimisation and favouritism by (i) returning the answer papers and making the

examination not 'secret' and (ii) by separating internal assessment from competitive assessment. The teacher-student ratio will have to go up with such a system.

Many are not properly aware of the gigantic nature and the extent of national effort put in in the field of education. Nearly 100 million students, several million teachers and non-teaching staff and about a million institutions: such is the size of the community vitally interested and involved in education.

As we have mentioned earlier, one of the major problems in the educational system is the commercial interests of the private sector. It is neceassary to start a debate on the 'commercial' nature of many of the educational institutions and the support given to it by the governments.

What we have so far stated is only a tentative outline of a reform which *could be* brought about if we initiate a public debate at the national level. Many of these reforms are *not* fundamental precisely because we do not pretend to locate the sources of fundamental change in the educational system. But 'something' has to be done. This 'something' would then become the source of inspiration for further changes.

TOWARDS A PEOPLE'S HEALTH MOVEMENT

B. EKBAL

The Existing Health Care System

Health and health problems can be understood only when they are seen within their social and regional context at different periods of time. If health is defined as the well being of man, then it can be said that to acquire the material basis for it man acts upon nature and in the process develops technology and social relations which, in turn, determine his well-being. In other words, the health status of individuals and groups is largely determined by the economic, technological and cultural factors.

Historically, from the magico-religious overtones of the earlier epochs the concept of health evolved into a more scientific one. The initial multidimensional approach to health got lost in the mechanical model of the industrial era. This led to the individualistic and curative approach to health problems where medical technology alone was considered sufficient to handle the problem. The emphasis on the biological basis of health continued with little efforts to bring out the significance of its social basis.

The dominant approach to medical problems which prevails in the west is clinical or curative. The perception of clinical medicine developed with the rise of industrialism and its basis was provided by the Cartesian model of the human body and the germ theory of illness. The pattern of health and diseases in these countries also changed with the changes in the productive processes. The earlier pattern of epidemics, pestilence, malnutrition and famine. prevalent till the 19th century gradually underwent a shift with the steady decline of infectious diseases. This was however accompanied by moderate increase in cancer and cardiovascular diseases till the early 20th century. After the 2nd world war the decline in infectious and nutritional

diseases, became more distinct and the incidence of cancer, degenerative diseases and iatrogenic diseases showed a steady rise. The industrialised countries of the west have now formulated a highly centralised, sophisticated and mechanical health delivery system which produces the commodity "Good Health" which has an exchange value but not necessarily a use value, as it did not always produce health but only suppressed symptoms.

The majority of the underdeveloped countries were formerly colonised by imperialist powers, which brought with them their own Western system of medicine. Although the concepts, approach and content of this imported system of health care were the same as in the West, their outcome in the colonised world was different due to their different objective conditions.

Since the main interest of the imperialist powers was to expropriate local resources in order to enrich their own economies, the growth of Western medicine in these countries was not only backed by a general betterment of the living conditions (as in the west in the early 20th century) but was accompanied by the definite disruption of the economic and social life of the people. The result was that undernutrition and insanitary conditions which promoted diseases became prevalent and so communicable diseases continued to persist together with nutritional diseases. These constituted the major cause of ill-health in these countries. The patronage given to Western medicine by the governments gradually destroyed the local system of medicine and thus further deprived the common man of any kind of health care. After the liberation of these countries the national governments did little to retrieve the situation.

The developments in the health field during the period of Indian colonisation followed the same trends as discussed for the Third World in general. The second half of the 19th century saw the gradual decline of such systems as the Ayurvedic and Unani and the laying of the foundation for Western medicine through British missionaries, philanthropists and the state. By the 1940s the Western concepts of health care; i. e. the clinical and curative approach based on modern technology and the supremacy of the physicians in decision-making had taken roots.

This meant that instead of taking care of the social dimensions of the health problems, developing a people oriented

service, and moulding medical technology to the needs of the people, the health sector under the banner of welfare services became a supportive structure for the profit-making venture. The health sector became an instrument for attracting foreign aid and patronage for the 'haves' through which they could exercise technological as well as cultural domination within the country. Over the past 30 years, then, with health services growing within the above framework, the gap between the haves and havenots has gone on increasing. In spite of the government's proclaimed commitments to provide effective health services to all, the majority still go without any care. The lack of non-medical facilities like housing, food, shelter and clean water has further complicated the problem. While it is true that the number of health service institutions, doctors and specialists have increased, the actual distribution has an urban and curative bias. On the one hand, the expansion of services has mostly been due to an increase in the curative services at the cost of preventive works and, on the other, preventive work has failed not only due to the paucity of preventive services but more because of lack of provision for the basic amenities of life like food, clean water, housing, clothing and employment.

The present system of medical education has no real impact on the medical care of vast majority of the population of India. The curriculum mainly emphasises areas which are significant for developed countries and the association of job satisfaction with intensive technological assistance. While medical education absorbs a significant amount of the resources of the state, training and education of paramedical workers are totally neglected.

KSSP's Activities

It is within this framework that the KSSP has been attempting for the past several years to initiate a debate on the relevance of the existing health care system and give shape to what may be called a people's health movement.

From the late 1970s KSSP concentrated its activities on health problems and formed the Environment and Health Brigade to co-ordinate such activities. KSSP introduced the subject and initiated a discussion on an alternative approach to the present

curative oriented, highly professionalised and institutionalised health delivery system. KSSP felt that nothing short of a people's health movement can save the common man from the clutches of the present health delivery system which is highly exploitative in character. The role of the multinational companies in aggravating the situation by marketing banned drugs and non-essential drugs on a large scale was also strongly criticised. A draft document detailing such issues was prepared and discussions in which doctors, paramedical workers, social scientists and social workers participated, were organised at various levels. That a radical change in the present health delivery system was needed was generally accepted but the details of the alternative approach could not be concretised.

KSSP started organising a number of medical camps in the rural areas. Through these medical camps KSSP came in contact with a number of doctors some of whom started appreciatig the activities of KSSP. The medical camps were mainly curative in nature and we soon realised that such camps were only rural extensions of the urban-based hospitals. But the rural people were happy in that they could now consult some of the specialists and felt that KSSP is concerned with their problems. It was not possible for KSSP with the available resources to carry out follow-up service to those who were treated in such camps. We also felt that undesirable value systems will be further consolidated by such curative-oriented camps.

Our next step was to organise health education camps with emphasis on preventive aspects with the cooperation of the socially conscious doctors and paramedical workers who were identified at the earlier camp. As part of the conscientisation compaigns by KSSP a number of health education classes were organised which slowly evolved into a platform for nonformal education for the rural people. Subjects like personal hygiene, environmental sanitation, infectious diseases and food habits were discussed in such classes. The rural people had a number of questions to ask about these subjects which in turn was self-educative to the doctors who spoke in these classes. Doctors for the first time came in contact in a personal way, with the problems of the rural poor. KSSP's compaigns exposing the activities of the multinational drug firms attracted mainly the educated middle class. A people's resistance movement against

the non-essential, harmful and banned drugs is yet to take shape. KSSP fully realises that this can be achieved only with the co-operation and collaboration of many other organisations.

In the *Sastra Kala Jatha* organised by the KSSP a few items were focussed on such issues which were well appreciated by the public.

KSSP is still in the process of formulating its approach to health problems. So far we could sensitise a few doctors and other health workers about these issues but much work is yet to be done.

KSSP feels that joint action at the all-India level is possible in a few priority areas, details of which is to be worked out in this convention. Propoganda against the anti-people activities of the multinational drug companies is one such area to be considered. A critique of the medical education and alterative approach to the present system should also be seriously thought of.

V

SELECTED PAPERS OF THE PSM CONVENTION, 1978

PEOPLE'S SCIENCE MOVEMENTS

(A brief review of the All-India Convention of People's Science Movements held in Trivandrum, India, November 10-12, 1978)

There has been a growing realisation among scientists and social workers in the country that science and scientific research in India as presently taught and practised, has acquired an elitist character with little or no relevance to or concern for the needs of the people. This has led to the emergence of a number of voluntary organisations ranging from those explicitly oriented towards the "popularisation of science" to those which seek to inculcate among the masses a scientific approach to understanding society and social change as a necessary pre-condition for progressive social transformation. These groups, spread all over India, vary in size and scope ranging from small groups working on particular problems in a limited area to a mass movement like the Kerala Sastra Sahitya Parishad (KSSP) with a wide range of activities spread over the entire State. A significant feature of these new activities is that they have begun to attract highly trained scientists and technologists who have become disenchanted with the relevance of what they have learnt and what they are doing in the "scientific establishments" to the needs of the people. So far, these initiatives by different groups have remained highly localised with very little communication between them. In order to establish contact among such groups and provide an opportunity for them to learn from each other's experiences, the KSSP organised an All-India Convention of People's Science Movements in Trivandrum. The three-day convention(November 10–12, 1978)was attended by over hundred workers from all over the country.

Those who participated in the Convention included the following groups: Science Education Group, Sastra Sahitya Parishad, Shramik Sanghatana, Bhoomi Sena, Indian Insitute of Education, Bhim Sakti Tarun Mandal (Maharashtra), Gram Vikas Mandal, Science Circle, ASTRA, ASHA (Karnataka),

Association for the Promotion of Science Education (Tamil Nadu), Vidushak Karkhana, Kishore Bharati (Madhya Pradesh), Vikshan, Scientific Worker's Forum, Bangiya Vigyan Parishad, Science and Technology Committee, Health Education and Policy Group (West Bengal), CSIR, Society of Young Scientists (Delhi) and Programme for Community Organisation and CSIR Regional Complex (Kerala).

The discussion at the Convention was focussed on the following general themes: (i) formal and non-formal education; (ii) people's health movements: (iii) scientific research and technology; and (iv) "science for social revolution". The discussions were based on "theme papers" on each topic as well as detailed presentations of the activities of each of the participating groups: Besides formal "plenary" sessions, there were numerous opportunities for informal exchange of views among the participants. The proceedings of the Convention will bring out a rich variety of experience of the participating groups and of the discussions at the Convention. This brief review is meant only to bring out some of the main highlights of the conclusions emerging from the Convention.

The discussion on formal education noted that the weaker segments of the population get little benefit out of the system: few of their children get into it and a distressingly large proportion of them drop out easily; the system itself is far too elitist and fails to impart skills relevant and useful for the livelihood of the vast majority of the people, not to speak of inculcating the habit of identifying problems. These deficiencies call for a drastic reorientation and seeking solutions to the present system, which is the essence of the scientific attitude. The convention felt that such reorientation should, among other things, have a built-in vocational bias, make vocational pursuits compulsory for all students at the secondary stage, tailor the vocational orientation to the needs of the people and build on the existing indigenous skills and knowledge. Following this approach, some of the groups represented at the Convention had initiated innovations in curriculum, pedagogy and teaching materials, especially in the teaching of natural sciences. But such efforts even when successful, have to overcome powerful vested interests before they can be spread widely. In any case, the basic purpose of people's movements is to cater to the masses who remain outside

the formal system and hence their focus will have to be much more on non-formal education.

Non-formal education has to perform a dual role: first, to take care of the large majority of the people who are not reached by the formal education system and second, to act as a supplement to the existing formal education system. It was recognised that the conventional notions of education will not be relevant in the realm of non-formal education. There is no teacher and the taught; the people who come to learn are not ignorant and there is no given evaluation method. Non-formal education must create an awareness in each man of his social conditions. It should consistantly strive to demolish all myths of "modern society", myths which are perpetuated by the formal education system and the mass media. In short, it must lead to a new outlook on life and the world and an attitude of self confidence and assertiveness. The non-formal education approach could embrace different sections of the population: adult illiterates, women, workers, and the public at large. A variety of pedagogic methods, depending upon the local situation and sufficient flexibility in content, should be built into the programme of non-formal education. Bureaucratisation in a non-formal education programme is apt to make it not only ineffective but also counter-productive. The present attempts at non-formal education vary from the use of audio-visual methods to focus the attention on acute social problems like housing among the poor(as employed, for example by Science Education Group in Bombay) to the method of study classes, quiz competitions, classes for skilled and semi-skilled workers and adult literacy centres (as employed, for example, by Kerala Sastra Sahitya Parishad). The role of voluntary organisations in the non-formal education programme was recognised to be very crucial one.

A lot of time, both in formal and informal sessions, was devoted to the need for a people's health movement. The present health delivary system in India caters to the needs of the richer sections of the population. That the majority of the people do not receive adequate health care from the existing system and that the system has built up a very high cost structure leading to the emergence of powerful and interconnected pressure groups of medical practitioners and the pharmaceutica

industry was emphasised. In initiating a people's health movement, care should be taken to look at the objective social, economic and political conditions under which the majority of the people live. Therefore, health care is a means through which the majoriiy of the poor should be helped to come out of their social and economic backwardness. The Convention underlined the need for a new outlook among the medical practitioners. There is need for a debate on the ills of the existing system and the search for alternatives in satisfying the health requirements of the people. There exist a number of voluntary groups, both national and international, who have been working towards an alternative health care system capable of reaching the poorest sections in the society. With the meterial already available, a well thought-out document giving an alternative approach to the present health care system should be prepared and circulated among the medical practitioners and others connected with it. At same time, a meaningful discussion on the various health sciences should be initiated so as to relate them to the objective conditions of the country. In such a discussion, the preventive and curative aspects and also the urban and rural orientation of different systems should be brought out. The example set by the People's Health Centre in Bangladesh was highly commended and the Convention felt that it should be subjected to a closer study and analysis as it offers a great deal to those who are concerned with people's health.

The awareness that research in science and technology must be of relevance to people's needs led to the question: who are the people? Since the irrelevance is mainly in relation to the poor people, the groups identified in answer to the question are the following: agricultural labourers, poor and small peasants, rural artisans and craftsmen and the urban workers.

It was recognised that a reorientation in the direction of research in scientific and other "establishments" towards the needs of the people is not possible unless a radical social change takes place. But in the meantime scientists, who are aware of the misdirected and irrelevant research, have an important role to play in breaking the total isolation of the "establishment" from the people. For this purpose, it is necessary above all for scientists to reject the elitist idea that they can solve people's problems from "outside" and instead be prepared to learn from

medico friend circle
[organization & bulletin office]
326, V Main, Ist Block
Koramangala, Bangalore-560 034

the people and from their perception of the problems. This would require a vigourous interaction between scientists and the people.

Considering the social and political constraints which operate in our society it was also recognised that there are limits to what the scientists can hope to achieve through their commitment to relevant research. From this point of view, a distinction has been made between the generation of technologies appropriate to people's needs and their actual implementation and diffusion. The generation of technologies suited to the needs of the people and within their means was recognised as an important first step in the struggle for their implementation, for such knowledge about the existence and technical feasibility of means for raising the living standards of the poor people is important to the process of the struggle itself.

This led to the question of the political struggle and the necessity for scientists to establish communication with mass movements encompassing both political parties and such organisations as the KSSP. Accordingly three forces, viz, scientists committed to research on people's needs, voluntary groups such as those represented at the Convention, and mass movements of the people were recognised as the constituent elements of a movement for bringing about the desired change in research. Mutual interaction among the three groups will not only bring "relevant" problems of research to the forefront but also ensure that struggle takes place in favour of solutions offered.

The "problems" of the people vary from region to region. An action programme, however, can be thought of in terms of the basic needs: those relating to housing, domestic energy, health and craftsmen. The precise content of the underlying research must be left to the people and the scientists working with them.

The slogan "Science for Social Revolution", adopted by the KSSP raised many questions that deserve serious study. A theme paper on the subject dealt not only with the role that science movements can play in bringing about radical social change but also with the precise character of the movement in Kerala. While accepting modestly that the KSSP is a mass movement only in the sense that it reaches the masses on a wide scale, those associated with the KSSP noted also that there are trends within

212
HEALTH CELL

the movement which could make it revolutionary in orientation.

It was for the first time that a number of voluntary groups came together in a common forum to discuss questions relating to their involvement in the process of social and economic change and share their experiences. The very act of coming together was a rewarding experience for many.

REFLECTIONS ON "SCIENCE FOR SOCIAL REVOLUTION"

M. ANISUR RAHMAN

The purpose of the following is to stimulate reflection and investigation about a phenomenon which deserves serious study to answer the many questions it raises.

Seeds of an Intellectual Awakening

A convention of this scale on "people's science movements" is a signiffcant event. It asserts that a culture of "people's science" is emerging, or at least is seeking to emerge, in this region in South Asia—knowledge created in institutions alien from the people is returning to the people. It my be questioned whether this has yet taken on the character of a "movement", except in Kerala where a mass movement of scientists to go to the people is indeed visible, and the slogan "science for social revolution" has been popularised. But it may be questioned what kind of "social revolution" such a movement can be expected to promote.

Last August an account of the Kerala people's science movement was presented by the convener of this convention to the cadres of a poor peasants' movement and organisation in Maharastra engaged in intense struggle with money lenders for liberation from bondage, for reclaiming land illegally alienated to the latter, and for obtaining legal minimum wages. The cadres asked: "What is the relevance of such initiatives for the poor's struggle against exploitation?" The same cadres had been asked earlier how much conscious attention their organisation was giving to the development of productive forces in the areas in which they had gained political and economic space through their struggle. To this they had replied that this was an academic question: their struggle at this stage was political, and the oppressed peasants would take to productive initiatives only when they would see the need for them to fight this political

struggle; mereover, this consciousness would have to emerge from their concrete struggle and not from abstract analysis.[1]

As against this the popularity of the science movement in Kerala among the masses of its people is perhaps beyond doubt. Apparently, the masses are seeing in it a means of satisfying some of their felt needs–perhaps an access to knowledge that they must be seeing as useful in terms of their current aspirations. Whether this is true of the entire cross-section of the masses in Kerala, in particular of the poorest strata of its society, may be questioned. The general popularity of the movement does nevertheless suggest that there is a basic difference in the objective reality of this State compared to that in other areas in the sub-continent, which has generated and sustained such a science movement here and not (yet) elsewhere.

The two situations touched upon above are perhaps two extremes. Other "people's science" initiatives at smaller scales have been taken in other parts of the sub-continent, and a number of these have been sustained over significant continuums of time. Whom they are benefiting, and exactly in what way, are questions for in-depth investigation. But does one discern in these various initiatives the seeds of some kind of an intellectual awakening, a search for a new identity emerging from among the intelligentsia, manifest in a common urge to go to the masses of the people and seek to be of direct service to them as intellectuals equipped with scientific knowledge and a power of scientific analysis?[2]

Three Trends

In terms of the objective conditions prevailing in the region the generation of such an awakening is not surprising. The typical syndrome is:

a) perpetuation and aggravation of mass poverty;

---

1 See GVS de Sylva, Niranjan Mehta, Anisur Rahman and Ponna Wignaraja, *Bhoomi Sena, A Struggle for People's Power*, (pre-publication draft), 1978, pp. 98-99.

2 As distinct from the Gandhian tradition of going to the people to serve them in a framework of "simple living" that seemed to reject man's urge for scientific knowledge and its application for creative self-expression and for ever progressive improvement in the conditions of his living.

b) continued polarisation of property, income and privileges through openly exploitative and often oppressive processes;
c) failure to develop the productive forces particularly in the rural society, notwithstanding continued advancement of science and technological knowledge;
d) humiliating dependence on foreign aid, embodying among other things foreign knowledge and technology.

Intellectual frustration under such conditions may not be surprising. A people-ward intellectual movement under such conditions, however, can have an indeterminate combination of the following three trends:

(1) humanitarian: a matter of personal conscience, without any social rationalisation;
(2) nationalist: an urge to contribute to the development the national personality, coupled with realisation that this requires development of the economic conditions and the creativity of the board masses of the people, with whom therefore science and technology must link directly;
(3) radical: an urge to contribute to the liberation of masses from social oppression and exploitation and through this to the release of creative mass energy, a task in mass mobilisation which needs intellectual input and a scienticisation of mass culture.

The Variety of Possible Initiatives

A mixture of these three trends can in turn generate a variety of "people's science" initiative:

a) *Frontier Challenges.* Going to the people and enquiring what their material needs are, and applying scientific and technological knowledge to meet them at costs within the means of a greater number of people... the "appropriate technology" school in which the scientists remain the main actors, taking on "frontier challenges" to help the poor that require the application of sophisticated science or technological knowledge beyond the immediate grasp of the masses;
b) *Knowledge Transfer.* Mass education in science and technology;

c) *Stimulating Mass Creativity.* Working together with the masses to devise "appropriate techonlogy", in the process stimulating technological creativity of the masses and enhancing their capacity to create technology;

d) *Technology as a Tool in Political Struggle.* Divising technology to serve as a tool in the political struggle of the exploited masses against their exploiters—more "self-reliant" technology from the point of view of the poor, through which they may have greater control over the production process;

e) *Conscientisation.* Seeking to raise the capacity of the poor to analyse their environment scientifically and bringing to them scientific knowledge of wider reality, to help them appropriate courses of action to change reality in their favour.

As far as appearances go, the first three varieties are consistent with the first two trends (humanitarian and nationalist). The third of these may not be inconsistent with the radical trend and may be seen to overlap with the fourth. The fourth and fifth are explicitly radical (note however that "conscientisation" in improperly motivated hands can be reactionary or reformist aimed at preserving or marginally improving, the societal status quo).

Form Isolated Initiatives to Movements

None of such initiatives has any social significance as long as they are limited to isolated efforts of local dimensions. If they do develop into wider movements, however, they introduce a new social culture and mode of social communication. The result can be socially significant, and may even go beyond the intended or apparent motivation of the initiators by generating new social dialectics which may take courses charted out by its own momentum.

To develop into a movement such initiatives require:

a) appropriate subjective conditions in terms of:
   i) urges among the intelligentsia to go to the masses;
   ii) urges among the masses that respond to the specific initiatives that the intelligentsia choose to take;

b) objective conditions that make it possible for these

initiatives to fulfil significant aspirations of the masses, e.g., "appropriate technology" may be devised, or knowledge and skills acquired through scientific education, which may not be marketable at wide scales until there is a fundamental change in the pattern of income distribution; on the other side, attempts at political "conscientisation" may fail because the masses do not see social contradictions to be sharp enough to give priority to political action over, say, economic that could immediately benefit them and for which there may still be room.

The Movement in Kerala

To what kind of "social revolution" the people's science movement in Kerala can contribute? By its explicit objectives and what reports we have,[3] it includes more of the first three varieties than the last two. If the movement is widely popular, it apparently satisfies the subjcetive conditions (i)and (ii). These subjective conditions themselves should in turn be rooted in the objective reality of Kerala; there is poverty and there is exploitation; but is the state of exploitation so acute, the situation so oppressive, that the masses feel they have no hope in the social system as it is and is evolving? Note that there has been a succession of effective reforms in the State in the recent past and the transition from feudal and semi-feudal production relations to capitalism is at a relatively advaned stage. Once capitalism really emerges, the situation does not become immediately "revolutionary" again: there is room available for the development of productive forces without another change in social relations.[4] Furthermore, income and consumption disparities, the difference between town and country—in short, the gap between privileged and underprivileged—these seem to be less in Kerala than the general situation one sees in India. If this reading is correct, then the situation in Kerala today is not "revolutionary" in the classical sense. Does this explain why people's science

---

3 K P Kannan "Science for Social Revolution", *Economic* and *Political Weekly*, June 26, 1976.

4 c.f., Karl Marx: "No social order ever disappears before all the productive forces, for which there is room in it, have been developed."

initiatives without a political struggle content is finding a chord among the masses in this State? Is it that the masses aspiring only to be better incorporated into the emerging capitalist system, find in the science movement an easier access to the knowledge and skills that they feel they need to fulfil this aspriration?

I leave it to those more familiar with the situation in the State, and to more scientific investigation, to answer the above questions more convincingly. On these answers will rest the character of "science for social revolution" that is on the cards in the Kerala State within the near future: if the situation is not ripe for another structural change (change in "quality") yet, the only "revolution" that can occur is a *cultural* one, culture conceived in its broadest terms, including technology and the modes of social communication. Such a cultural revolution could speed up the process of "quantitative development" of the society by *broadening the base for creative initiatives* that a scienticisation of mass culture and an integration of the intelligentsia with the masses could provide. In a process of capitalist development, this would essentially mean an alliance between the bourgeoisie and the direct producers to share the responsibility for innovation (as a trade-off for a wider sharing of the benefits of capitalist development that socially conscious masses insist on getting!). As a by-product, this may also make capitalism in Kerala more humane, where people would care more about people.

In thus speeding up the process of "quantitative develop-ent" such a cultural revolution *may* contribute to the advancing of a subsequent "qualitative transformation" of the society. But it would be too early to speculate on this at this stage.

Bringing the intelligentsia to the masses can have another by-product in reducing the distance between intellectual and manual labour, a fundamental class division in societies that has transcended many structural transformations. The accomplishment in this regard will vary according to the nature of the initiatives taken: the taking on of "frontier challenge" to help the poor implies only a tangential contact between the intelligentsia and the masses, and the basic division of labour and its premises remain; so it is in the case of initiatives to transfer scientific knowledge to the masses. Possibilities of greater

intergration of intellectual with manual labour are however generated in initiatives of the latter three varieties.

Science in More "Revolutionary" Situations

Elsewhere in India the situation is different. To go to the other extreme, what is the role of the intelligentsia (science) by way of helping the poor, in situations where the state of exploitation and oppression is acute, and a pre-capitalist mould prevails in which productive forces are unable to develop further short of major structural change,i.e., from pre-capitalism either to capitalism or to collectivist production relations? The objective situation then is revolutionary, and the task is to mobilise the people to make the revolution. The enormity, and the many dimensional challenge, of the task is unquestionable. But, and precisely because of this, a scientific (intellectual) input into the process is critical. What should however be the character of this input?

Here ideas as well as practices differ. One trend assumes that intellectuals know "what is to be done", and "revolutionary intellectuals" are to mobilise and lead the masses for structural change and social reconstruction. While structural change may thereby be accomplished, question remains whether dependence of the masses on the intellectuals will not continue, and the fundamental objective of radical action, namely, to liberate and develop creative mass energy will not be frustrated, whether, fundamentally, the alliance between "revolutionary intellectuals" and the masses to accomplish structural change will not split later into a new class division, with the intelligentsia (technocracy) ruling and deciding things for the masses?

The other trend, perhaps still in the process of emerging, believes that the *process* of bringing about structural change is as important as the change itself, and this process should be dominated by *conscious and organised mass action* if structural change is not to degenerate into elitist rule by technocracy over the masses. The fundamental task of revolutionary intellectuals with this perpective is to initiate processes of conscientisation and organisation of the masses through which not only structural change may be accomplished, but conscious and organised mass power countervailing to the formal power of insitutions, offices and specialists entrusted with specific tasks may also be created

with the capacity to resist the abuse of such formal power.

None of these two trends is practised in its purity nor is it possible to do so in reality. The first, the *elitist* trend in revolutionary practice, is usually mixed with spontaneous mass initiatives in response to events, that go beyond leadership or central designs. The second trend, the *mass-line in the very process of mobilisation for structural change*, has to compromise in reality with the need for centralist impositions according to exigencies of circumstances. But "revolutionary intellectuls" need to clarify their minds as regards their basic commitment which will determine their strategy when there are options, and this is essentially a choice between *leading the masses* towards social revolution and *raising the capability of the masses* to make one, in alliance with the intelligentsia but not in subordination to them.

The role of science in *raising mass capability to make a social revolution* is critical. It consists, first and foremost, of generating a scientific attitude and culture of scientific enquiry among the masses, so that they can move from sensory perceptions of their social experience to conceptions and analytical frames and from fatalistic prejudices to a realisation of their power to change reality in their favour; adopt systematic methods of investigation of their problems; learn to synthesise experience and consider alternatives systematically. The second important role is to bring to the masses systematic knowledge of the wider social structure of which the immediate environment of the masses is an organic part to which the masses are less exposed, a knowledge that is critical in choice of strategy for social action. A third is to bring to them the experience of initiatives to change society, taken elsewhere.

When combined with such a role, initiatives to develop "appropriate technology" analytically determined *jointly with the masses*, in accordance with the requirements for the struggle for social change, can be of considerable value. Struggle for social change is a hard course to take, and a combination of economic initiatives to give greater staying power to the masses in this struggle, if this is possible, will certainly help. Search for appropriate technology with this political perspective is therefore valuable. The involvement of the masses in their struggle for social change, or still better, if they are stimulated in this by the

struggle itself, may be even more valuable, by demonstrating to them that it is in their power not only to change the social reality but the physical reality as well, thus giving them a consciousness and personality that may stand them in good stead if there is ever a threat of technocracy taking over the reins of the new social system to come.

India is a vast country, and the objective situation differs widely on its terrain. What is the appropriate role of science in people's development in situations which are less clearcut than either of the above, e. g., in situations where exploitation and oppression is acute but room still exists for economic (technological) initiatives to improve the material status of the poor, at least up to a point? Many persons will deride such initiatives as "reformism". But can the masses be easily mobilised for exclusive political action for structural change if space for economic improvement within the existing structure still exists? Should progressive forces stand aloof from such space and leave them to be filled by real reformists thereby distracting mass attention from the need for fundamental social change for a more sustained improvement of their lives? Or should a combination of economic and political mobilisation be attempted, which would hence give wider scope for people's science initiatives to apply a fuller kit of its tools?

The Movement Must Continue

While these questions are debated, the "people's science movement" should continue. This for three reasons: first, the debate would be abstract, at the level of mere intellectual gymnastics, if it were confined to conventions and seminars amongst intellectuals only. The people must be involved in the debate, and for this alone the intelligentsia must go to the people, to discuss with the people how best they can contribute to a revolutionary release of people's creative energy. Secondly, the debate must also be rooted in social practice, i. e., initiatives have to be taken in order to find out what kind of initiatives would be most appropriate. The process of life and social dialectics is dynamic and no static knowledge is appropriate to steer it towards progress—one must lean to take the best feasible initiative to start with according to existing knowledge and reality, and adjust action thereafter to new knowledge and

changes in the course of reality that the initiative itself may generate. Finally, "revolutionary intelligentsia" is not a closed, static set either: it is a set that is continuously created and recreated by social processes, through which new elements are added and some old ones become obsolete. If elite intellectual life itself is producing "drop-outs" who seek an identity with the struggle of the oppressed, one may expect only more of such consciousness to emerge in intellectuals from a direct contact with the people. We have been told that in the Kerala science movement itself scientists initially motivated simply to transfer knowledge to the people have started seeing the social dimensions of the problem of mass poverty. Seeing the real dimensions many will undoubtedly fear to "cross the line", but some will, and "*one* will split into two", releasing a stream that will reinforce and enrich the revolutionary trend.[5] Such positive potentials of the process will be larger, the larger the movement can become, besides the direct positive contents of such a movement as sugggested earlier (broadening the base for creative initiatives and reduction of the gap between intellectual and manual labour). It is difficult, indeed, to think of a richer cultural base for a social revolution than a massive contact of the scientific community with the broad masses of the people.

5 c. f., the "May 4th Movement — the First Cultural Revolution — in China". See Chow Tse-tsung, *The May Fourth Movement, Intellectual Revolution in Modern China*, Stanford, 1960, for the fullest account and analysis of the movement, and Mao Tse-tung, "The Culture of New Democracy", in *Mao Tse-tung on Literature and Art*, Peking, 1967. 5-10-78.

ASTRA*

Since ASTRA is a programme of the Indian Institute of Science, a brief introduction to this institution is necessary. The Indian Institute of Science is one of the oldest institutions in India. It was conceived in 1898 by Jamsetji Nusserwanji Tata, and founded in 1911, the delay being largely due to obstruction from the colonial rulers.

Today, it has 22 departments—the usual array of engineering and basic science departments plus a few special centres for "frontier" areas such as molecular biophysics. These departments function with 304 faculty and 1,136 students. The reccurring expenditure of the Institute was Rs. 28.2 million in 1976-77.

At several stages in its approximately 70 year old history, the institute has made distinguished contributions to Indian science and technology. Its development of the process of extracting sandalwood oil has yielded to the Government of Karnataka returns which are of order of magnitude greater than the inputs to the Institute. Its courses in electrical communication, aeronautics and metallurgy have produced alumni who have become leaders in these fields and who head many of the associated industries. Many great names like Raman, Bhabha and Sarabhai are associated with in the Institute. Thus, it may be considered to be one of the premier institutions in the country.

Educational, Scientific & Technological Institutions in Developing Countries

Notwithstanding its uniqueness, the Institute has displayed many characteristics typical of educationl, scientific and technological institutions in India and most developing counrties. Such institutions are overwhelmingly manned by an elite with a "westernized" life-style and aspirations, often accentuated by

---

*Cell for the Application of Science and Technology to Rural Areas, Indian Institute of Science, Bangalore-560012, India.

foreign training. This elite is alienated from the rural poor and from their traditional technologies. This alienation is amplified by the strong linkages with corresponding "western" institutions. Hence, indigenous institutions derive from western institutions the patterns of organization, emerging areas of research, their trends and fashions, the sustaining stream of ideas, techniques and inspiration, the criteria of excellence and the sources of recognition, awards and kudos. However, completely unlike their "western" counterparts, developing country institutions are invariably deserted by indigenous industry which favour the attractions of improted technologies.

The result is that educational, scientific and technological institutions in the developing countries tend to be elitist, alienated, unwanted and without native roots. As a consequence, they tend to be pre-occupied with irrelevant work or with work which is only relevant to urban industries/problems and/or to the "west"

Origin of Astra

A growing awareness of this perhaps, unconscious boycott of the needs of rural areas, and in particular of the needs of the rural poor, led a group of faculty at the Indian Institute of Science to propose to the Institute the formation of a *cell for the Application of Science and Technology to Rural Areas* with the acronym ASTRA meaning "weapon" in Sanskrit. ASTRA was formally created in August 1974 as a voluntary group to initiate, catalyse, sustain and grow in the Institute work of relevance to rural development. ASTRA, therefore, was born with a well-defined mission, viz., the generation and diffusion of technologies appropriate for rural development, and the promotion of the sciences underlying these technologies.

Basic Approach of Astra

To achieve its mission, ASTRA formulated an innovative approach which is based upon its view of rural development as a socio-economic process directed towards

(a) satisfaction of the basic needs of the rural population, starting with the needs of the rural poor, in order to reduce inequalities between different sections of rural society and between rural and urban areas;

(b) increasing rural participation and control in order to promote the self-reliance (as distinct from self-sufficiency) of villages; and

(c) harmony with the rural environment to ensure the sustainability of development.

The crux of this approach is *a formal commitment to a neighbouring rural area.* There are three necessary components to this commitment:

(1) becoming aware of the problems of the people in that area, and in particular of the poorest sections;

(2) making the generation of technologies appropriate to the development of that area a part of the academic programme of the Institute, and not an extra-curricular activity of a few scientists/engineers with an urge for social work;

(3) promoting the diffusion of such appropriate technologies.

Special machanisms were also envisaged for these components.

An awareness of the real problems of the people cannot be acquired from the isolation of the Institute; it must be actively pursued by identifying the felt needs of rural people through direct interaction with them. It is not a question of deciding from the alienated viewpoint of the Institute what should be the problems of the people; it is a process of learning from the people what they feel their pressing problems are.

Similarly, the selection of technologies appropriate to rural development cannot be left to "wise" men in ivory towers; it must be the culmination of a process of interaction with the prospective beneficiaries. This process should consist of the following steps:

(a) generation of a range of technological options for the satisfaction of the identified felt needs;

(b) presentation of these options to the people; and

(c) enlisting the active participation of the people in the selection of that option/those options most appropriate to their development.

Thus, the process consists of dispelling ignorance through dynamic interaction with the people, i. e., the discovery of appropriateness through flows of information, suggestions, criticisms,

etc., from the people and to the people. The attitude is one of "scientists don't know which technologies are appropriate, but there is a process which enables them to find out". All this is radically different from the usual approach in rural development circles, viz., " 'we' know what technologies are good for 'them' ".

The generation of technologies must be distinguished from the diffusion of technologies--whereas the entire responsibility for generation can be assumed by an institution of education, science and technology, the diffusion of technology necessarily requires the collaboration of several types of institutions (people's organizations, development agencies, raw meterials procurement and product marketing organizaitons, financial institutions, etc.). ASTRA's approach, therefore, is to concentrate on technology generation, and with regard to large-scale technology diffusion to promote it by participation in multi-institutional teams.

Implementation of Astra Approach

In implementing its approach, ASTRA has focussed on two mojor lines of activity.

The first involves the establishment and operation of an *extension centre* amidst a cluster of villages near Bangalore:

(a) to acquire a grass-roots understanding of the felt needs of the people through direct interaction with them;

(b) to expose the people to a wider range of technological options insead of the two-option Hobson's choice with which they are currently confronted, i.e., either sub-optimal traditional technologies or far-too-expensive "modern" technologies;

(c) to understand technology diffusion problems by micro-diffusion in the cluster of villages.

Incidentally, the Extension Centre is also intended to provide Institute faculty and students with simple basic facilities for living and working in a rural environment.

The second line of ASTRA activity involves the introduction of projects, studies and researches of rural relevance into the academic programme of the Institute, i.e., into its B E and M E projects and courses, its Ph.D and faculty research, and its sponsored projects.

Astra Projects At the Institute

Thus far, ASTRA projects are in the areas of (1) energy, (2) building, (3) water, (4) agro-processing. (5) resources, and (6) transport. The choice of projects has been the result of a compromise between the interests of the Institute faculty members and the felt needs of people in the cluster of villages around the Extension Centre. In cases of mismatch between faculty interests and people's needs, the separation of technology generation work on the Institute campus at Bangalore and technology demonstration at the Extension Centre minimizes unwelcome consequences.

(1) *Energy.* The energy projects fall into three sub-categories: (a) Rural Energy Planning (b) Alternative Energy Sources and (c) Energy Devices and Applications. Under Rural Energy Planning come the projects on rural electrification, rural energy consumption patterns, scope for wind energy utilization, biogas-based energy centres for villages and the assessment of various energy sources. The projects on Alternative Energy Sources are on low-cost windmills, design and optimization of biogas plants, biogas-fuelled spark-ignition engines, methane enrichment of biogas by carbon dioxide separation, and energy forests. Of the variour energy devices and applications being studied/developed are biogas burners, biogas melting furnaces, village "chulas" (cooking stoves), solar thermal conditioning and water heaters for sericulture and wickless kerosene stoves.

(2) *Building.* Four sub-categories of building projects are in progress: (a) System studies, (b) Walls, (c) Roofs and (d) Construction. The System studies consist of a survey of rural housing, the development of a systems approach to rural building technology, a study of the role of transport in building activity and determination of the energy content of building materials. The projects on walls involve investigations of rammed earth, soil cement blocks and campacted mud blocks. Ferrocement and bamboo-polythene-lime *surki* roofs are being investigated. Under the category of construction activities come the projects on the construction of the biogas laboratory at the Institute and the dormitory and faculty house at the Extension Centre.

(3) *Water.* Water harvesting and water lifting are the two basic

sub-categories of the projects related to water. The water harvestsng projects involve studies on rainwater collection from roofs and farm-ponds, and the water-lifting projects are on scooter-tyre water pumps, modification of handpumps, fluidyne pumps and a survey of water-lifting devices.

(4) *Agro- Processing.* The agro-processing projects deal with decentralized processing of agricultural products and residues. They include the production of cellulose fibre from groundnut shells, edible cellulose from rice husk, plastic and plasticisers from castor oil, sodium silicate from rice husk, soap on a small-scale and calcium carbonate from biogas.

(5) *Resources.* The projects on resources involve studies of bamboo resources in Karnataka and of villages as ecosystems.

(6) *Transport.* The projects on rural transportation consist of studies on bullock carts and on pedal-powered vehicles.

Ungra Extension Centre

An Extension Centre has been established 113 km away from Bangalore on the outskirts of Ungra village in Kunigal Taluk, Tumkur District, Karnataka State. fifty-five acres of government land which was once used for a seed farm and then for a horti-cultural training school, have been secured from the government on long lease. The three buildings, which were constructed for the seed farm, have been repaired and brought back into use as accommodation for the Institute staff and students engaged in projects. The Extension Centre has access to about 15 villages within a 3 km redius.

The work at the Ungra Extension Centre can be classified into five categories; (1) Natural Resource Surveys, (2) Energy Studies, (3) Agriculture, (4) Water and (5) Building.

(1) *Natural Resource Surveys.* Surveys of flora and fauna in Ungra, and of the land and soils in the Extension Centre have been carried out. An aerial remote sensing survey has also been done. A meteorological station has been established and data are being collected regularly.

(2) *Energy Studies.* A detailed survey of rural energy consumption patterns has been carried out for Yedavani, Pallerayanhalli, Ungra and Kagganahali in the first phase, and for Ungra, Pura,

Suggenhalli, Kilara, Arjunahalli and Hanchipura in the second phase. A biogas-based energy centre for Pura is being designed. An energy forest is being grown on a part of the Extension Centre land. A study has been made of energy consumption in a brick clamp at Ungra. A survey of "chulas" at Pura has been carried out. A windmill has been installed at the Extension Centre and its performance is under study.

(3) *Agriculture*. Crop production on a limited scale has been taken up. In addition, experiments on programmed vegetable gardening are in progress both in the Extension Centre and in the Pallerayanhalli school.

(4) *Water*. Studies on water harvesting have involved the construction of a minor tank (100 ft long x 6 ft high with 50,000 cft capacity) and of farm ponds. Water lifting projects include field testing and studies on modified handpumps and on scooter-tyre pumps.

(5) *Building*. Alternative building technologies have been tried out in the construction of a dormitory of 1,540 sq ft plinth area and a faculty house of 484 sq ft plinth area.

Interaction with Villagers

Interaction with the people from the neighbouring villages has taken place through (1) the energy surveys, (2) the discussions on the community biogas plant proposed for Pura, (3) the enquiries regarding the ASTRA windmill, (4) the enquiries about the ram for compacting mud-blocks, (5) the vegetable gardening experiment carried out in the Pallerayanhalli school, (6) the development of "chulas", (7) the training of village youth as technicians and (8) the visitors to the Extension Centre.

Technology Diffusion

The Ungra Extension Centre has provided a grass-roots base for the understanding of technology diffusion into the cluster of neighbouring villages. This is micro-diffusion. To achieve diffusion on a larger-scale, ASTRA has envisaged other mechanisms: 1) meso-diffusion through the Karnataka State Council for Science and Technology whereby proven technologies, e. g., modifications to handpumps, are disseminated by

government development agencies to all parts of Karnataka, 2) macro-diffusion through national organizations, e. g., All-India Handicrafts Board, 3) bilateral diffusion by linkages with voluntary group and with like-minded institutions in other parts of India and 4) educational programmes to be organized by ASTRA, e. g., the two one-day seminars on handpumps for about 300 government engineers from the Department of Public Health Engineering of Karnataka.

Lessons from Astra's Experience

(1) *Model for the institutional generation of appropriate rural Technology*

The four-year experience of ASTRA has amply validated the model adopted by ASTRA in 1974 for the institutional generation of technologies appropriate for rural development. This model consisting of (a) the establishment of extension centres in rural areas and (b) the incorporation of a commitment to those rural areas into the work programme of the institution, is rapidly spreading. For instance, the Development Technology Centre, Institute of Technology, Bangkok, Thailand, and the Korea Institute of Science and Technology, Seoul, Korea, are using a similar approach.

(2) *Methodology of selecting appropriate rural technologies*

The interaction with the rural population through the Extension Centre has lent considerable support to ASTRA's three-step methodology for selecting appropriate rural technologies, viz., 1) identification of the felt needs of people through direct contact with them, 2) presentation to them of a wider range of technological options and 3) selection by the people of the appropriate option.

(3) *Role of scientists/engineers qua scientists/engineers*

The above methodology has clarified what role scientists/engineers should play as scientists/engineers. They should translate the felt needs of people into technical problems, and then carry out the research and development work to widen the range of technical options which can satisfy the felt need.

(4) *Transformation of Traditional Technologies*

The conventional approach to generating appropriate rural

technologies is to start with expensive urban/large-scale technologies (most of which have originated in the west) and cheapen/simplify/down-scale them for rural use. In addition, ASTRA has found that the transformation of traditional technologies is quite promising an approach. That is, traditional technologies (which may have become sub-optimal because of changed conditions, constraints and possibilities) can become a rich source of appropriate technologies if their rational scientific basis is understood and they are qualitatively improved with marginally costlier inputs of modern science and engineering.

(5) *Heuristic for R & D perspectives*

ASTRA's concept of widening the range of technical options available to the people has led to a powerful methodology for discovering R & D perspectives. If, for instance, a rural house is viewed as a system with the foundation, walls, roof and services as system components, then, for each component, there are a number of options. Further, various integrations of component options result in various system options with increasing performance efficiencies at incremental cost increases. It is from such a range of system options that the people can meaningfully select appropriate options. Accepting such an approach, the generation of an R & D perspective (and therefore programme) simply involves (1) R & D on all available and new component options and (2) R & D on all system options.

(6) *Appropriate ruarl technology ≠ primitive, low technology*

ASTRA's experience demonstrates that simple products/processes invariably require sophisticated thinking/research/development and that, therefore, appropriate rural technology is advanced high technology (and not primitive low technology) if the advanced/"high" character of a technology is to be judged by the extent of modern scientific and engineering thinking and not by the trivial criterion of scale of production of "western" origin.

(7) *Appropriate rural technology requires greater emphasis on basic research*

The indigenous re-development of urban/large-scale/centralised technologies can be based on pursuing the path followed by the "west". Since, however, there is no beaten track for

appropriate technologies, there is no alternative to starting from fundamentals. This experience of ASTRA implies that the base of fundamentals must be stronger to generate rural/small-scale/decentralised technologies than to imitate/adapt urban/large-scale/centralised technologies. Of even greater importance is the lesson that efforts to generate appropriate rural technologies necessarily require more, not less, simultaneous emphasis on basic research and fundamental science.

(8) *Model for generating technical capability*

ASTRA's strategy of commitment to the problems of people in a specific rural area has led to an intense learning process through which technical capability is acquired rapidly, effectively and cheaply with existing infrastructure. The environment is the best teacher provided that there is commitment to that environment. This strategy is radically different from the conventional approach of building technical capability by identifying frontier areas from a study of the output of Western institutions and competing with the West in those areas. The implicit belief here is that the West is the best teacher.

(9) *Appropriate rural technology—An exciting challenge*

ASTRA's projects have turned out to be as scientifically sophisticated and technically challenging as any other work in the Institute.

(10) *Approach to the promotion of scientific temper*

The strong interaction with the people in the selection and generation of appropriate rural technologies leads to a widening participation in innovation. It is this democratization of innovation which seems a far more promising method of promoting a scientific temper amongst the people than the usual approach of science popularization through lectures and exhibitions.

(11) *Generation of appropriate rural technologies—A powerful method of conscientization of scientists*

ASTRA's experience has shown that the process of identifying the felt needs of people and the presentation to them of a range of technical options is a powerful method of conscientizing scientists and engineers into an understanding of the facts and origins of rural poverty.

(12) *Approach to inter-disciplinary programmes*

ASTRA has become a genuine inter-disciplinary programme involving about 35 faculty members from 6 departments. This is mainly due to its mission which is well defined and significant. It is this mission which has attached scientists and engineers, drawn them together, influenced them and made their capabilities reinforce each other. It is also the mission which has made the whole more than the sum of the parts.

Future Work

(1) *R & D programmes*

It is envisaged that the future R & D work of ASTRA will involve (a) intensification of efforts in the current areas of interest as well as (b) expansion into new areas. The main emphasis in the current areas of interest will be on the development of an R & D perspective within each area, viz., energy, building, water, agro-processing, resources and transport, so that work can be initiated on the gaps in the perspective, and also the separate projects can be co-ordinated into a coherent programme. Since the present thrust of ASTRA reveals several areas crucial to rural development in which no work at all is being carried out, it is envisaged that efforts will be mounted in these areas, viz., water management in agriculture, agricultural implements and machinery, health, education, etc. A health centre and a school at the Extension Centre are being planned.

(2) *Block-level planning*

The elaboration of these R & D programmes will be carried out in the context of attempts to elaborate a block-level plan in which resource inputs are matched to development needs in the Extension Centre region. An integral part of this effort will be an attempt to understand the basis for the self-reliance of villages, clusters of villages and blocks as ecosystems.

(3) *Information*

The mounting volume of literature on appropriate rural technologies which is constantly accumulating with ASTRA will be organized into an information system. It is intended that this information system will become a service to the large number of institutions and groups which are engaged in generating

and diffusing rural technologies. At the same time, efforts will be made to disseminate information on appropriate rural technologies developed by ASTRA and other institutions/groups. Links will also be forged with appropriate technology information systems abroad.

(4) *Teaching programmes*

With the growth of understanding and expertise various scientific and technological aspects of rural development, efforts will be made to contribute to and develop teaching programmes in the Institute. These teaching efforts will be grown organically from seminars to workshops to short-term courses to full courses to academic programmes leading to a diploma/degree. It is envisaged that the products of these teaching eforts will go to development and planning agencies, district industrial centres, etc.

(5) *Expansion of ASTRA*

Thus far ASTRA has developed only programmes attracting the interest and commitment of the existing faculty of the Institute. It has not acquired any faculty specifically appointed for the ASTRA programme. This process of transforming the interests of existing faculty is approaching saturation. Hence, the implemention of future programmes requires the recruitment of faculty specifically dedicated to the ASTRA programme, along with support staff and more intense student involvement. In short, now that ASTRA has demonstrated its viability and significance, a major expansion of ASTRA both at the Institute and at the Extension Centre is under consideration.

BHOOMI SENA MOVEMENT

The Bhoomi Sena movement in Palghar (Maharashtra) started in 1970, primarily as a struggle of the Adivasis to recover land alienated from the small peasants to the Sawkars who were initially the local moneylenders. The movement which started more or less as a spontaneous reaction of the exploited and oppressed Adivasis, on the social and economic plane, found an initial rallying point in the movement against land alienation and bonded labour. This initial success created an awareness that it was within the power of the tribals to change the socio-economic order of which they were a part. The organisation now has effective influence in over 80 villages of the district.

The Bhoomi Sena began its work in an area where already some work had been done by the Sarvodayis, led by Aba Karmarkar. It was essentially the failure of the Sarvodayis and the throwing out of Aba, which gave rise to the spontaneous solidarity expressed by the tribals. The process of consolidation of this spirit was helped by both indigenous as well as outside cadre.

While the early phases of the movement were concerned essentially with the inplementation of laws regarding alienation of tribals from ancestral land, minimum wages, abolition of bonded labour, etc, the organisation soon branched off into other activities. It must be realised that although the Bhoomi Sena movement has been engaged in the struggle for realising the legal rights of the Adivasis, its origin in spontaneous rebellion against injustice and its organisation into a political organ have themselves been outside the normal political and administrative framework. In this sense it was not the authorities who transferred power to the Bhoomi Sena to implement the law; rather it was the collective power of the exploited tribals which got crystallised in the formation of the Bhoomi Sena as an organ of people's power.

There have been concerted attempts to eliminate the role

of the consumption-loan linkage by setting up village level "grain-golas". There were moves to set up co-operatives to provide less expensive credit, handle marketing of products, etc. which reduced the area of operation of the trader. The moves have not been confined to the economic dimension alone. Having realised that there is a lull after each economic struggle, through the Tarun and Mahila Mandals, social and cultural issues have been taken up. One good example is the handling of the marriage problem.

The Bhoomi Sena had just completed a successful struggle for the abolition of bonded labour. At the time of the marriage of one of these freed labourers, when a Sawkar was approached for a loan, he refused, stressing the point that the struggle had led to a parting of ways between him and his labourers. A meeting of the village people was then called and the issue was discussed. Various marriages, essencially their expenditure patterns, were analysed. It was discovered that the major expenditure was on liquor and that this was consumed mainly by the Sawkar and the village Patel. With this realisation the tribals came to the conclusion that the old form of marriage was undesirable as they not only had to incur heavy debt to buy the liquor, but did not also get to drink most of it. Consequently it was decided to change the marriage form, and liquor was replaced by *sherbet*. A Brahmin friend acted as the priest and the entire village participated in the wedding with unusual gusto. Within a year, nine such weddings took place.

The organisation is also running schools in many villages, not as part of a literacy campaign but to use education as one of the inputs in the struggle. There is a talk of designing alternate health and legal systems. What is most refreshing about Bhoomi Sena is the decentralised organisation which through its various *mandals* ensure fantastic mass participation. A questioning ability has been inclucated in the masses from the very beginning and it would be difficult for internal authoritarianism to survive for long. The fluid organisational structure, the movement from a partial to complex intervention strategy, the mass enthusiasm and participation generated, all in an organised form, mark out Bhoomi Sena as an organisation to watch.

CENTRE OF SCIENCE FOR VILLAGES (WARDHA)

In 1935, when Gandhi started the All India Village Industries Association (AIVIA), he had invited the top scientists of the day to be on its Advisory Committee, including Dr. Jagdish Chandra Bose, Sir C. V. Raman, Acharya Prafulla Chandra Ray and others. The experiments in village industries he got initiated were meant not only to improve the existing crafts in the rural areas, but also to introduce new techniques on the basis of latest scientific knowledge, which would improve the rural economy. True, efforts so far fall far short of the expectations of Gandhi, of converting the rural habitat into an ideal setting which could afford man the fullest expression to his being in close communion with fellow human beings on the one hand and Mother Nature on the other. Yet, as we look to the results of rural developmental work done by voluntary agencies under Gandhi's inspiration for the past 50 years we find that there has been great impact leading to the formation of 1,600-2,000 dedicated people in small groups working independently covering a large number of villages. The field of their activities is varied, eg., Khadi and village industries, welfare of tribals, removal of untouchability, basic education, agriculture, welfare of women and children, etc. This is no mean achievement in a country where the gulf dividing the urban elite and the village people is probably the widest, the communication between the elite class and the masses is weak, and the understanding of the realities of the villages by the decision-makers is poor. Through these institutions, the application of science and technology has to be done to meet the requirements of the poorest and to pursue the unfulfilled dream of Gandhi.

The Line of Approach

The procedure to be adopted for this endeavour will have to take the experience of the past into consideration and lay down the future plan of action, in which all the available resources are utilised in such a way that the lowermost will be benefited.

The following points could act as guidelines in this.

a) The kind of techniques which we pick up for the villages should be such as to touch the life of the poorer sections of the people and bring hope to the oppressed.

b) These techniques should increase the avenues in rural employment, prevent the erosion of talents from the villages and enrich the life of the total community.

c) All institutions engaged in rural work, along with their usual activities, should undertake the responsibility of introducing some appropriate techniques in their field. This activity of transfer of technology for the benefit of the poor will give ready results, and it will also bring confidence in the fulfilment of the long-range plans that are being implemented by the institutions.

d) In introducing new methods, it is necessary that the technological institutions and the scientists assist the voluntary organisations doing constructive work, adding to the efficient functioning of the project. This will give an opportunity for interaction between the scientists and the social workers.

Mobilising the Three Forces

The need of the day is to bring about a forceful movement by establishing co-operation between the voluntary organisations, the scientific institutions and the industries, for the benefit of the less fortunate section of the society. India possesses the third largest group of technologically trained people in the world. The result of their scientific work, however, is unable to bring ready benefits to the large number of people living in the villages, as it is mostly urban-oriented leading to greater economic stratification of the society.

The other great force that can bring about rural development is that of the industries in the country. The industrial sector should not only look for increasing production, but also be responsible for the welfare of the weakest and the removal of disparity in the land.

The Next Step

All these three forces, the agencies doing constructive work, the technological institutions and the industries, require the establishment of bilateral links and need a source from where information about the applicable techniques can be obtained.

To facilitate such co-ordination, the following are being undertaken by the CSV.

a) *Documentation and Dissemination*

To collect and disseminate all such information from the technological institutions and other agencies in India and abroad which will fit in with the objective laid down above.

b) *Demonstration and Experimentation*

Such of the experiments which have been tested and found to be fruitful, should be demonstrated at the centre.

c) *Field Application*

In this work, the various voluntary agencies working in rural areas will be approached and through them the techniques which need to be perfected at the field level, i. e., in the villages, will be tried before making them available to the nation. Each institution could choose a few techniques and experiment them in one or more key villages so that small villages around them can observe a particular technique that is being introduced, and thereby motivate people to apply the observed technique.

d) *Co-ordination in Endeavour*

The three kinds of institutions mentioned earlier could associate themselves in a co-ordinated movement. This general plan is expected to lead to a cohesion amongst various agencies involved in the constructive work, taking the new technology to villages. This is no doubt a very ambitious scheme and requires a tremendous amount of labour. But the optimism is that if once the people concerned catch the idea, beneficial results will flow out of it in a short period of time and will spur the nation towards the required direction.

The Centre of Science for Villages (CSV) in Magan Sangrahalaya, the museum for rural industries founded by Mahatma Gandhi in 1937 at Maganwadi, Wardha, will work for the fulfilment of the *Sutra* (formula) of

Science+Spirituality=Sarvodaya (Welfare of all).

Implementation

Centre of Science for Villages on the basis of the approach initiated above, which was approved and consigned by Acharya Vinoba Bhave, took its first step in 1977. CSV puts before you the work it has done for the past one year. Initially

the Centre started with the collection of relevant information regarding the application of scientific techniques to the rural areas, from various sources, and published it in the form of a booklet. Then to post all the new techniques to those who are interested in rural development, CSV brought out a bulletin called "Science for Villages".

Along with gathering and dissemination of information, demonstration of the applicable techniques was taken up. A low cost house was constructed at the Centre, with the technical know-how and assistance of the Building Research Institute, Roorkee. This model house is designed to suit the black cotton soils found in Wardha. In collaboration with Appropriate Technological Development Association, CSV organised a workshop on solar energy and collected some solar heaters and fabricated some cookers, which are being tested and exhibited.

CSV took up a scheme to improve sanitation and to do away with manual scavanging of night soil in some areas of Wardha where large numbers of poor people live. The scheme is to provide simple lavatories and train masons in building aerobic manure tanks. The Centre was instrumental in getting Wardha selected as one of the 20 districts in India for a project of Integrated Rural Development. CSV emphasized the need for introduction of new employment avenues for the landless and planned two schemes, (i) hand-made paper units from the fibres of banana stems which go waste, and (ii) improvement of workshops of the village blacksmiths, which is going to be taken up soon. In Varud village the mud walls of some of the houses were coated with bitumen spray to guard them against erosion, ball-bearing pulleys on wells were introduced, soakpits and lavatories were put up for environmental cleanliness. A dozen villages were chosen around Seldoh, where late J C Kumarappa had worked, for the introduction of techniques with the association of Leprosy Relief Institution, Duttapur. Here intensive work is proposed to be taken up. For this CSV is making a project report on a prototype station for rural techniques and this will be submitted to the Department of Science and Technology, Government of India, for financial assistance.

Links have been established with the Central Research Laboratory of Khadi and Village Industries Commission, which is adjacent to CSV.

GRAM VIKAS MANDAL (BELGAUM)

Belgaum Gram Vikas Mandal (BGVM) is a voluntary organisation working in villages around Belgaum city. One of the initial activities of the BGVM was the organisation of the powerloom workers in and around Belgaum. We in the BGVM propose to start Community Centres where the rural poor could informally meet and discuss their problems. We would only act as catelytic agents, providing new material for thought and action. Different activities like the organisation of village libraries, group songs, literacy camps would be taken up. Already three centres have started functioning and the response is encouraging. In all this we are convinced that "popularising science among the people especially in the rural areas, with a view to developing a scientific approaeh to development problems" is very important.

The Struggle of the Powerloom Workers of Belgaum

It will be a great surprise even to the inhebitants of Belgaum, to learn that Khasbag, Madavnagar, Vadgaon, Bharatnagar and Shahapur areas of Belgaum house not less than 5,000 powerlooms and that there are over 8,000 people working for the flourishing powerloom industry of Belgaum.

These powerlooms are owned by over 200 well-to-do individuals. The owners of these small factories are well organised under "The Belgaum Powerloom Owners and Twisters Association". Some time in the past the Government of Karnataka had passed orders to include powerloom industry under the purview of the Factory Act. But nobody was serious about implementing the provisions of the Factory Act. It remained a paper tiger, but not for long. The owners' association connived with the Government authorities and got the order changed to exclude such factories from coming under the Factory Act. They exploited the situation to the maximum. Besides working out ways of tax evasion and the like, the owners had also developed ways of exploiting the workers.

To start with, the 8,000 powerloom workers of Belgaum were not even recognized as workers. They were not given appointment orders or service cards, nor was there any official register showing the workers' names. As a result of this, the workers could be sent away and replaced by others at the whim and fancy of the owner. The "trouble makers" could easily be got rid of. There was nothing strange in it, nor was it a rare occurrence, when an owner told a worker who had been working for him for years that he was not emploped by him. The workers had to be greateful to their benefactors for poviding them employment when hundreds of others did not even have employment. The powerloom workers had to work overtime without getting overtime wages. The maximum earning of a powerloom worker was about 100 to 120 rupees a month. There was discrimination in the wages paid to the male and female workers. Workers were at the mercy of the owners. They had no guarantee of getting work every day. If the owner so wished, he could tell the workers that there was no work for the next few days and so no pay either. Workers enjoyed neither paid holidays nor paid leave. They were not given any bonus.

Workers continued working under these conditions for years. From time to time they tried to organize themselves to demand their rights, but every time they met with failure and frustration. There were two trade unions for these powerloom workers. Many of them were members of one or the other union. But how much interest did their leaders show in bettering the workers' condition? They were interested only in the votes of the workers. A vote had value, but not the worker who voted!

The workers were divided among themselves. There were numerous things that divided them. Their caste affiliations: some were of low caste, others were of high caste. Their party affiliations: some were pro-congress, some pro-communist, and others pro-janata. Their language: some spoke Marathi, others Kannada. Some wanted Belgaum to be in Maharashtra, while others prefrred Karnataka. Their religious affiliations too had its role in dividing them. With all these the powerloom workers of Belgaum had hardly any hope of coming togther, of fighting together, of establishing their identity as workers. Such was the situation of the Belgaum powerloom workers. Will their condition change?

But then, as it used to happen on a number of occasions earlier, the fire of anger and frustration that lay buried in the heart of these workers was fanned into a small but visible flame when a group of 70 workers in one of the factories decided to go on a strike on November 14, 1977. As usual, the workers involved were threatened. Their strike was declared illegal. They had not given a prior notice. They could not be thrown out and replaced by others. At least the leaders could be victimised. The workers became panicky. What next? How to save their face?

Some of these workers had come to know a group of young men and women in Belgaum. They were known under the name the Belgaum Gram Vikas Mandal. Some members of this group had been to the places where they work, had chitchat with them; they had even conducted study classes for them. They had listened to their problems and shown sympathy.

The members of this group were known for their commitment to people. They had opened their eyes to the social reality around them. They had seen the proverty, misery and oppression which their less fortunate brothers and sisters had to put up with daily. They felt angry about the way people were treated. They were willing to fight to change this situation by working to build up power among the powerless.

They were analytical, were observant and took note of facts, sought to find the deeper realities behind the apparent. They were selfless, not buried in a little world of their own self-interests, not even of their immediate family. People of Belgaum had seen them active in Belgaum city and the villages around. When the Aluminium Factory workers were struggling for their rights last summer, these people openly supported their struggle. In all that they did, they affirmed their faith in the oppressed classes and people knew that one of their ambitions was to unite all the workers and other poorer sections of society in Belgaum city and in the villages around. With this aim in view they had organised the workers' day celebrations with a rally and public meeting on May 1, 1977.

To their predicament, the powerloom workers who had dared to go on strike now approached the members of the BGVM. They got a sympathetic hearing. They were shown that their strike was perfectly legal. They were not bound to

follow the provisions of the Factory Act or give a prior notice since they were not covered under the said Act. Their minimum and just demands were that

1. they should be recognised as workers, hence every worker should be given an appointment order and service card,
2. they should be given extra wages for overtime work,
3. they should be given paid holidays in a year,
4. when there is lay off, they should be given lay off wages,
5. they should be given 8.33% bonus, and
6. those who participate in struggles should not be vactimised.

The members of BGVM felt obliged to support this struggle. They joined the workers in their strike and morcha. As a result of this, on the fifth day of the struggle (November 19, 1977) the owner concerned the accepted workers' demands. This group of workers celebrated their victory that evening and reported on work joyfully the next morning.

The successful struggle triggered off a chain reaction. From November 23rd onwards, one after the other, the workers of other factories wanted to go on strike on the same demands and under the leadership and guidance of BGVM. Of course, the BGVM had played its catalytic role very effectively. Now the BGVM had the tremendous task of educating the workers, organising, planning and co-ordinating their struggle.

The BGVM was not a trade union. If it had to represent the workers it needed authorization from the workers. Hence the workers of respective factories had to have their own meetings and had to reach a unanimous decision to authorise the BGVM to represent their cause. They had to set up their own committees, elect their own representatives, etc.

The BGVM had the task of educating the workers, of conscientising them about their problems, about their strength and weaknesses, about the factors that divide them, about the strength and weaknesses of the owner's association and the strength of their money and influence with other power structures, how the Government, the law and order system and the police force in the country worked, about the powers and limitations of people like the Labour Commissioner, the District Commissioner (DC),

etc. BGVM had to create hope for success, create confidence, had to show that the workers' sole strength was their unity, co-operation and determination to win. The struggle had to get public sympathy, sympathy from other unions and organizations. BGVM had to establish its own identity. It had to show that it had no axe to grind in the bargain, that it was not representing any political party, that it was not interested in votes but in the workers for their own sake. It had to counteract accusation thrown against it. All this meant a lot of activity.

Day in and day out, practically 24 hours of the day, members of the BGVM were with the workers, listening to their problems, seeking solutions together, dispelling the darkness of their ignorance and fear, helping them to grow in awareness, confidence and hope. Street corners and market places soon became schools of learning. Morchas, street corner meetings and open public meetings were part of the daily routine. People were already getting used to the police and C.I.Ds. They had realised for themselves that there was no room for violence in workers' struggle. The BGVM never failed to impress upon the workers that any form of violence would defeat their cause in the given situation.

Within a week's time, 800 workers belonging to 17 different factories were on the street on strike. Workers and the members of the BGVM now clearly saw that they had to form a union. The owners' association had refused to negotiate with the BGVM and the workers' representatives on the ground that they were not a recognized union. So a union was formed: the Shramik Shakti Sanghatana. Members were enrolled, office bearers elected, constitution and by-laws framed and all the necessary papers for registration sent to Hubli.

The powerloom workers were one of the poorest sections of workers in Belgaum. 800 of them were already on strike, many more wanted to come out on strike. How long would the strike last? How could the families of the poorest of workers save themselves from starvation? These problems worried the leaders. So the BGVM took a few decisions together with the workers. No more workers would be allowed to come out on strike. Committees should be set up in each of the 17 factories to study the economic condition of the strikers. The poorest among them should be helped. The respective committees will decide who

needed help and how much. Fund should be raised to buy food grains to those in dire need. An action committee has to be set up to chalk out the day-to-day programme and to evaluate the current events and developments.

Neither the BGVM nor the workers had to beg for donations. Sympathizers, rich and poor were giving what they could, to see that the workers' struggle continued till their demands were met. Contributions in cash and kind came in from varied directions. Now even the poorest of workers had not to fear of starvation. They could atleast have one meal a day. The workers who were not on strike supported the ones on strike. They had by now learned the meaning of brotherhood.

Negotiations at the Labour Commissioner's office on the 2nd and 13th of December ended in failure. The owners were adamant in not giving the workers their demands. The workers were determined to fight, to put up a stiff resistance. They were united. Nothing and nobody could break their unity now. They saw their strength in their unity. For once the workers were ONE. The other unions joined in and support came in from all directions. The BGVM succeeded in doing the impossible: uniting all the powerloom workers of Belgaum.

This strike was not just a time of noise and slogan shouting only, it was a time for sitting idle at home. It was a time for learning. This was the BGVM's way of conducting a school of non-formal educatson, issue-focused learning through the methodology of action reflection (praxis). It was a time for people to learn the value of co-operation and corporate action, of concern and love for one another, a time for affirming in practice the brotherhood of man and asserting their own human worth.

The struggle went on and on, disciplined struggle, non-violent beyond imagination. The regular public meetings were attended by hundreds of people. Often the speakers in these meetings were the workers themselves. Men and women who had no voice so far were very eloquent now.

Half way through the struggle, one morning the newspapers carried a good piece news for the workers: The factory Act is made applicable to powerloom workers. If this is implemented, all their demands would be met. But on the next day, December 22, the owners declared lockout in the whole industry. The lockout, as anybody could see, was an attempt by the owners to

break the workers' unity. They thought that the victims of the lockout would turn against the strike. But the owners were disappointed. The workers saw through their wicked tactic, and decided that those on strike and the victims of the lockout should work hard in hand, tooth and nail. The Bandh organized on December 20 had a huge rally and a public meeting attended by thousands of workers which should have given the owners an idea about their unity. But the owners refused to learn.

The victims of the lockout had committed no crime, placed no demands, had not gone on strike, were reporting regularly on duty, and yet were jobless now—thousands of them. The BGVM had to guide and organise these workers too. With the workers' unanimous consent, all marched to the D C's office. They decided on an indefinite dharna day and night at the D C's office till the lockout was lifted. Five to six hundred people sat day and night at the D C's office, calm and peaceful, demanding to provide jobs for 7,000 workers rendered jobless overnight through the lockout. They were a force!

Workers on strike continued going to their respective factories during work hours for demonstrating in front of the factories. Outside the factory hours they came for meetings. Now, regular meetings were held at the D C's office and in the open spaces around it. Here again many more workers got time to reflect on the social reality of oppression and of poverty. On an empty stomach they seemed to learn faster. The cold of the winter nights did bother them, but they couln't care less for it, for the fire within them gave warmth. They were prepared to suffer and even die for justice and for their rights. This was again a school of learning, men and women learning together, understanding the social structures. They saw with the help of their friends from the BGVM how the established values and patterns of the society cared for those who have and reduced the have-nots to things to be manipulated and used.

Workers with red flags became a routine sight at the D. C.'s office. The satyagraha and chain fasting continued. The strike too continued without even a stray instance of violence on the part of the workers. Attempts at reconciliation by the D. C. on December 23 again failed. There remained hardly anything to be done at the district level. Now the matter was referred to

Bangalore.

Though the struggle had been going on for the past 32 days, the workers were not tired, at least not their spirit, their body sometimes fainted with fatigue. This struggle for them was a matter of life and death. They had faced too many defeats in the past, so this time they must win. They mustered strength to go on. For them it was their schooling period—a luxury.

But there were cracks in the owners' association, a lot of infights. They could not hold on longer. Their powerlooms were getting rust eaten. Individual owners began to negotiate with their respective workers. Privately they admitted that the lockout is illegal, they were willing to pay some compensation. They requested the workers to go back to work, were ready to grant their demands and agreed to abide by the final agreement when it is reached. Under these conditions many workers started working again.

Soon there was an order from Bangalore (on January 7) banning the lockout. The workers were jubilant. Victims of lockout went back to work. But those on strike continued the struggle. Soon another order followed that banned the strike too. The case of the powerloom workers was now before the Labour Court for decision. But the workers could not afford to wait for the decision of Labour Court—it may take years. They knew that if they continued the agitation they could now be arrested and jailed. The leaders had explained these things to them. But the decision was theirs; they continued the strike peacefully. The leaders were now threatened by the police and were requested again and again to call off the strike. But they did not heed to this, they and the workers were willing to take the consequence of continuing an "illegal" strike.

On January 18, a group of strikers decided to celebrate the 50th day of their struggle, in a peaceful and reflective manner. On the same day the owners too were having a meeting in a nearby temple. During the meeting some goondas sent by the owners burned the workers' red flag. The workers shouted slogans challenging this unwanted action. In the confusion one of the scooters parked nearby was set on fire by some one. This was enough to accuse the workers of violence. The police interfered and arrested and lathi-charged the workers. Leaders and workers were arrested not only at the meeting place but also at different

parts of the city. Police violence did not scare away the workers. They assembled in thousands; took out a morcha to the police station in protest. There they were lathi-charged again. Altogether 54 persons were arrested and carted off to jail. While the arrested people were being taken away, there was only one cry to be heard from the workers united in their thousands: "Shramik Shakti Zindabad".

This incident did not destroy the workers' unity. At a public meeting that followed the arrest and lathi-charge, workers unanimously decided to continue the struggle; in place of the arrested leaders new leaders sprang up. Those in jail were not eager to come out. They intensified their learning sessons. Jail life for them was a seminar on social problems lasting for 14 days at the expense of the Government.

The owners again began to see that nothing could break the workers' struggle. They began searching for ways of reconciliation. By January 25 some possibility of settlement was seen. So, two of the leaders came out on bail. On January 29, after a long session lasting from 5 p. m. to 2.30 a. m. an agreement was made in which practically all the demands of the workers were met. On January 30 all the arrested people were out on bail. On the 2nd February, at another meeting with the owners, another agreement was signed stating that agreement signed on January 29 would be binding on all the members of the Belgaum Powerloom Owners and Twisters Association and the members of the Belgaum Shramik Shakti Sanghatana. Thus ended the 70 days old struggle of the workers.

"Shramik Shakti Sanghatana" is the name of the trade union born of the struggle of the Belgaum Powerloom workers under the leadership of BGVM. It was officially registered on January 10, 1978. It is a new trade union, with a new leadership, with stress on workers' participation at all levels. It is open to all workers. A unique union, the leaders of which suffered with the workers, they shared the hardships of the workers, their sleepless nights and hungry stomachs. Their life-style, more than what they talked, communicated to the rest of the workers the joy that comes from suffering for the sake of justice. In all that they spoke and did, the leaders affirmed the dignity of man, even of the least, the worth of human labour, values of sharing, co-operation, corporate action and common brotherhood of man.

RIPPLES AND REPERCUSSIONS

A reflection about the work and activities in a fishing village called Marianad in Kerala State, India.

Today we speak about mass movements and mass organisations. A few years ago we spoke about community development and various kinds of projects. Approaches change and science develops with experience and experimentation so long as there is an openness to learn and a commitment to the cause of liberation.

The experience at Marianad, a little fishing village 25 km north of Trivandrum city in Kerala is the history of a community caught in the pangs of this painful process of struggle and the expression of a commitment to the cause of liberation by a group of men and women. It is the history of goodwill transformed into action. Action which commenced with the percept of helping people to help themselves, which bore fruits in the form of many community building efforts and organisations based on people's participation. Yet it is action which continues to be overwhelmed by the deeper questions of the basic unjust organisation of society. It is this factor, the basic unjust order in our society, that threatens or challenges even the most sincere effort in the cause of liberation at the micro level.

A Macro-Picture to Begin with

Kerala has a stretch of coastline about 590 km in length. In Trivandrum District, the southernmost part of the State, there are 46 fishing villages with a population of about 150,000 comprised mainly of the Christian fishing community with a few isolated Muslim and Hindu fishing communities.

In general, fishing villages, unlike the rest of the village structures in Kerala, are very clustered and densely populated. In the southern end of Trivandrum District where we find the most ancient of fishing villages such as Vizhinjam, Pulluvila and Poovar, population densities are as high as 5,500 to 6,000 persons

per sq km. These villages with their clustered thatched huts and highly insanitary conditions give rise to bad health conditions, risk of mass destruction by fire and quick quarrels. At the same time it gives a source of security and a feeling of togetherness although the latter can at times result in a very undesirable form of village chauvinism. Caste groupings exist among fishermen although all fishermen of one community belong to the same caste with no hierarchical set-up. The more educated may be the more respected especially since the educated move out of the actual fishing operations.

There are basically three types of fishing crafts—the plank canoes, dugouts and the catamaran. The catamaran is most certainly one of the oldest types of fishing crafts which is made by tying together logs of a special variety of soft wood with coir ropes. In Kerala the use of this craft is predominantly in Trivandrum District. Fishing gear consists of cotton and nylon nets which are used as shore nets or at a depth within 20 fathoms in the sea and the hook-line nets which are used for fishing beyond 25-30 fathoms.

Fishing is normally a collective venture. In general the total catch or the value received for it is equally divided by all those who take part in the operation after one share has been kept aside for the equipment.

Normally when fishermen bring their catch to the shore it is auctioned by a middleman to the small merchants (men who carry fish on cycles and women who carry fish on their heads) who then take it to the different markets. Since the bulk of the transactions are on a part-credit basis, as regards the final settlement the fisherman is always on the losing end. He does not consider this to be unjust for he has been tutored by the institutions and the individuals who express "concern" for him that he must be generous with what he has received "free" from the sea purely by the grace of God. Apart from playing on these sentiments he is always trapped in an ever tightening vicious circle of exploitation propagated by those who own (or claim to do so) the land on the sea-shore on which his dilapidated hut stands, by those who entice him with credit during the lean fishing seasons at prohibitive interest rates (60-120%), by some unscrupulous middlemen and sometimes the merchants, and also by the educated in the community who now have left fishing in

favour of other "more respectable jobs".

At the sea the fishermen ride the crescent wave—they hold their destiny in their own hands. But once they are on land they become the easy victims and slaves of the people who in reality depend on them for their living. This is the paradox of their position.

The women play an important role in the community. Traditionally their function was to carry the fish of their husbands to the market where they disposed it directly to the consumers. Although the number of women of the community still involved in distributing fish is large, the new constraints and forces that have entered their area of operation drive them to be more competitive and aggressive. Carrying fish as a headload to a market which can often be 10—15 km away from their village is a task of no ease. Added to this, there are the tasks of looking after the children and the responsibility of house work. It is a hard life and so it can be said that the prosperity of a fisherman's home depends to a great extent on the managerial ability of the women. Despite this the women receive a rather poor bargain in the other aspects of life. The man still is the head of the family and is the main decision maker.

Female children are certainly considered a "liability". The custom of the community necessitates that a girl who reaches the marriageable age be "settled down". The choice of husband depends on the dowry that the girl's family can offer in money or as fishing equipment. Often this can lead to the penury of the family. Very early in married life the responsibility of child-bearing in rather quick succession and the daily chores of house work commence and she begins to function in the routine.

Because of this routine the role of the women in the socialising process of the children is very ambiguous. In the already congested surroundings the young mother continues to stay with her parents (a matriarchal society) with no place to call her own and no privacy. A child just grows. He uses the surroundings as a latrine; cries when he wants food; goes into tantrums if he does not get what he wants and sucks his mother's breast till a younger one takes his place. If he does go to school at a later date it is mainly because he gets a noon meal there. The rest of the time he prefers to play around in the village and

enjoys the sea and the possibility of making a few paise by grabbing a fish from a heap set out to be auctioned. His language can be shockingly abusive—but this he picks up at a very young age from the frequent fights and brawls around the vicinity of his home. Surprisingly what his mother may give him is his fear of God—this is ambivalent in the whole community of Christian fishermen.

Christian Fisherman

The entire life of the Christian fisherman revolves around the Church as an institution. One is struck by the number of churches that tower above the poor huts as one drives along the coastal roads of Trivandrum District. Practically everyone of these has been built by the daily contributions of the fishermen collected in the form of a "church tax".

Their stability as a community depends on their church—the place where the three most important ceremonies take place: baptism, marriage and burial. Church committees that are dominated by the educated and the well-to-do in the village play the role of the *gram sabha* (village council) and are the reference point in the village. The priest is an important figure—appreciated if he is able to keep everybody peaceful, the poor and the rich. If he cannot, he runs the risk of being driven away by the people! Churches are crowded on sundays, devotions are plentiful, pious associations are many. The rule of Sabbath is strictly maintained—no man goes to the sea and no woman to the market. Briefly, the fishermen have a tremendous faith which, because of their dependence on nature, tends to be superstitious.

New Initiatives and Intangible Strings of Hope

Marianad was initiated by the Trivandrum Social Service Society (TSSS). Realising that it is difficult to work in the existing villages where the accumulated problems were too massive to tackle, the TSSS decided to work with a few families in a selected place. If this new experiment was successful they planned to extend the work to the other fishing villages.

They selected the uninhabited coastal village Alillathura (literally meaning "the shore without people") and purchased some 30 acres of land to create the village now called Marianad.

The programme was started by constructing low-cost houses through a house-building co-operative society. To create the community, fishermen from seven different villages who were willing to come and stay in Marianad were selected. There were initially 50 families. For the new settlers it was a difficult choice to make—to leave their native villages and their relatives and set foot on a tract of coastal area known for its ghost stories, poor fishing and desolation. They had nothing but the intangible strings of hope to cling on to. Inevitably the majority of them were fishermen who had nothing to lose by undertaking this risk—invariably the poorest. Along with the new inhabitants also came a team of community workers who were to live with the people and learn from the people. They had nothing to give but the best of themselves as persons.

The initial approach was that of community building and community development based on self-help, living with the people. The team was always at their disposal and a feeling of togetherness began to grow inspite of the difference among the people because of their different places of origin. The only guiding factor for the team was to commence with the needs that the people felt and expressed, to involve the people as much as possible and to keep the methods of operation as simple and as open as possible. No elaborate schemes, no big building, no expensive and sophisticated equipment.

In this way many programmes were initiated in the village. A public health programme, clubs for boys and girls, saving schemes, a nursery and creche and many other campaigns. The basic idea behind each programme was to initiate an informal educational process to initiate change, to build awareness and allow people to inspire confidence in themselves. Hence much time was spent in trying to make the people understand what was going on, encouraging their involvement and help them to take responsibility.

"Namukku Vijayikkanam" (We Must Succeed)

After about 7 years of such work, the team began to realise that no amount of community building would be effective and truly liberating if the economic matrix which formed the infrastructure of the community was not radically reorganised. The fishermen are poor not because fishing is not lucrative. They

are poor because they are being exploited and this exploitation has become institutionalised that they do not see and realise it for themselves.

After much study and inquiry, it was realised that unless the ownership of land, credit, production, marketing and savings were linked and controlled by the fishermen themselves they would not be able to get free from the clutches of the exploitative forces. But the big question before the community workers was how they could make the community conscious of the exploitation that has become so much part of the system and accepted as the "right order of things".

Round about this time one great need always being expressed by the people was the need for a church in Marianad so that they can really consider this as their own village. Some members of the team of community workers were against this because they were convinced that though this was a "need" expressed by the people it was not a priority. The male community worker in the team who had the immense advantage of being from the fishing community thought differently. He was convinced that if till now everything was taken up according to the genuine needs of the people, then this initiative of the people to build a church must also be taken up equally seriously. How this occasion can be used to achieve the real goal of bringing the people before the reality should be the task of the team and not *prima facie* rejection of the people's expression.

The people gathered and decided that they would build their church by collecting money for it, as was the practice in their native villages—a share of the daily fish catch (5%) which would be noted down and collected the next day by the man appointed to do the task.

The community worker used to spend a lot of time on the seashore seeing the catch the people brought back, the value for which it was sold to the merchants through the moneylender and from this was able to get a mental idea of the share that the church would get for that day. In the evenings the fishermen brought their share for the church fund. Invariably the actual amounts brought always varied from what was rightfully due when calculated on the basis of the value for which the fish was initially auctioned.

"Why this difference?" they were asked. "Is it that you

are dishonest?" No, that could never be especially when it had to do with the affairs of their church. There were other reasons. Gradually at these evening meetings with the men all the reasons came out one by one.

"I am indebted to the moneylender. He reduced the daily interest from the value of today's catch."

"The merchant who owed me Rs. 27 for yesterday's fish gave me only Rs. 15 saying that he incurred a heavy loss."

"I had to pay the auctioneer for auctioning my fish. He wanted Rs. 10 immediately, failing which he said he'd never auction my fish again."

The community worker talked to them about the possibility of co-operation in selling their fish; appointing a man of their own who could auction all their fish and also collect the money from the merchants; the possibility of saving where each may save small amounts but keep it all together and thus help each other in time of need.

Three months of discussions that were centred around the collecting of money for the church passed away very soon. The people had collected about Rs 1000. And then the day of reckoning came.

After one such meeting the fishermen continued to argue and discuss among themselves and finally came to the conclusion that even if it was to build a church they had to first have control over the produce of their hard labour. Enough was enough and now they would take their destiny in their own hands, come what may. They had reached the crescent of their emotion and enthusiasm. They decided to use the Rs 1000 as the initial working capital and wanted the community workers to sit with them to plan the details of the strategy for action and within a few days the campaign to free themselves from the moneylenders and sell their fish by themselves was started. The campaign had only one aim and it was expressed by the fishermen in two succinct words: "*Namukku Vijayikkanam*" (We must succeed).

Struggle: the Prerequisite for True Success

When the co-operative was started it needed a small shed on the seashore. The parish priest from the neighbouring village who was also coming to say Mass on Sundays in Marianad

came to inaugurate the construction of the shed. Two or three weeks after the start of the co-operative, the priest did not trun up for the Mass. All the community was waiting in the community centre where Mass was being said since there was no church in Marianad. Later, on inquiry, the priest said he did not come since he did not have the new books for the new liturgy prescribed for that Sunday. The next week also he did not turn up and gave another excuse. On the third week it was discovered that the moneylenders who were on the church committee of the neighbouring parish from where the priest came had threatened the priest and told him not to go to say Mass in Marianad. However, this the people did not understand since the priest himself was all support for the co-operative at the planning stages.

The issue did not stop there. The moneylenders succeeded in getting the support of the other parishioners of the six neighbouring villages to raise certain complaints against the Marianad fishermen regarding the method of fishing used by them. The fishermen of Marianad had introduced fishing with hook and line which was new to this coastal tract where the majority of the fishermen used only a beach net with which fish can be caught without going to the sea. The people around were instigated saying that since the fishermen of Marianad went out into the sea to catch fish with the hook and line the original settlers of that coastal area suffered a fish famine! It was therefore demanded that for three months of the year—December to February—the fishermen of Marianad should not go hook fishing. This hard proposition was supported by the Panchayat, some officials of the Department of Fisheries, local politicians and parish priests.

After long hours of deliberation with community workers the fishermen of Marianad accepted the proposition just to show the others that they would stand united. During the first two weeks of this period of restriction on fishing the people of Marianad suffered a lot. However what they failed to see when fully involved they saw while temporarily detached from the routine of hard work to earn a day's living. During this difficult time the moneylender approached the people of Marianad and said the restriction would be lifted if they agreed to sell the fish through him. On hearing this the people

knew who the real person behind the whole plot was and they refused to accept his suggestion or money.

By the end of the third week of the restriction the members of the co-operative managed to convene another meeting in the Panchayat office where the above mentioned leaders were present. Again all these leaders including the priests, wanted to continue the restriction as was agreed in the previous meeting. At this juncture one member of the co-operative stood up and said that they could not live without working and that they had decided to break the restriction and go fishing from the next day onwards because they realised that this whole issue was a big hoax. The pandemonium caused by this bold statement of a 'solitary fisherman' was momentous. They came back from the meeting, reported their decision and informed everyone to prepare to go fishing the next morning. They lined up their catamarans on the beach, prepared their hook and lines and also gathered all kinds of weapons to be used against anybody who might dare to stop them from implementing their decision.

"It is more honourable for a fisherman to die fighting for his rights in the sea which is the source of his living rather than starve to death on the land", was the rationale of that moment. Hearing about all happenings and the determination, the opponents withdrew from the fight. From then on, the co-operative started to function again.

With the growth of the co-operative many things began to change in the community. The fishermen realised that their catch meant money and so they began to bargain for a good price. They began to see the folly of the past and on the whole they began to know more, have more and participate more.

Today their co-operative is beyond doubt the only fishermen's co-operative that is completely controlled by real fishermen and certainly the only village co-operative that undertakes to sell all the fish of its members.

Ripples and Repercussions

With the initial success of the co-operative and the general atmosphere in the community, the team was convinced that change could be initiated in other villages as well. There are over 1000 fishermen co-operatives in the State initiated by the government and private individuals. None of them tackles the problems

of fish marketing which is the crux of the problem, and only a couple of them still function as co-operatives. In Marianad where the co-operative was actually started by people and where only actual fishermen have a right to membership, a truly co-operative effort seemed to be possible and to be the only means of change in the community.

On the other hand, the untiring living-in-and-learning-by-actually-doing approach seemed to bring a breath of human dignity and interest in life to a people who before, without a second thought would stretch out their arms and beg.

The best way in which this effort could be multiplied was considered to be the training of younger people from the village. Different kinds of training programmes were initiated like long-term intensive programmes to help young girls start self-help programmes in the village, short-term leadership programmes in the village, short-term leadership programmes to help young people play an active part in the village community. Such programmes commenced in 1969 and gradually beginnings were made in over 18 villages.

In the meanwhile the co-operative began to grow and the community in Marianad began to have its own identity on becoming a parish. This united the people and the community began to realise the value of a common united effort. Fishermen from distant villages with or without the assistance of the trained young people began coming to Marianad to see how the co-operative worked and to say they were willing to make all the efforts to start similar ones in their villages if they would have the know-how. In this way the co-operatives began to grow in other villages.

But as always, the team had many questions. They realised that increase in earnings and greater participation of the people in their own village affairs, no matter how encouraging it was from the point of view of progress, had also its own limitations. For instance:

—people who have been exploited for so long, on realising that there are possibilities of becoming self-sufficient begin to want to accumulate, given the first opportunity to exploit others.

—there are limitations in the present situation of people being able to manage their own affairs especially when it

comes to planning for the future.

—the good-intentioned educational and awareness building process, which is the main objective in the initial stages, begins to get out of hand and scope as the number and areas increase.

—the awareness growing process in itself does not change anything when undertaken in small pockets. The reactionory measures or anti-liberation programmes generated by institutions that maintain the *status quo* reach the groups in the small pockets through the various media and have a much more "socialising effect" in general. In other words, it is extremely difficult to create new individual consciousness when social consciousness in general maintains the *status quo*.

—as fishermen begin to earn more, their aspirations begin to grow. They send their children to school and they loose the taste for fishing. The education system plays its own socialising role and the young people, half-baked, can neither go back to fishing, nor can they compete for jobs in the cities and hence become a liability.

The Present is the Past of the Future

This brings us to where we are at present. With ten of us in what we call the animation team, our main area of work comprises the coastal tract of Trivandrum district. With co-operatives gradually taking roots in villages other than Marianad, we have chosen the co-operative structure as the means by which the first steps to change both the economic organisation in the fishing community and the means for continuous education in the community can be brought about. Nevertheless, however much we would like to have a more macro-approach, effectivity boils down to the participation of all at the micro level, which in its turn is linked up immediately with material needs of food, shelter and clothing. This calls for a large number of workers from the village itself. In numbers such workers exist—many of those who have undergone some kind of training in Marianad, meet regularly to discuss the problems they face in the field.

We have come to the conclusion that we need a much more direct approach in contrast to a vague one, the latter being one in which the events and issues are dealt with as they come

about instead of spotting out events and stimulating the issues that will help in the awareness building process. And again, awareness can be understood in many ways. For instance, people should understand how diseases are spread, or how they can earn more or better manage their incomes. This, we think is important but we are fully aware of the fact that this awareness can bring about no radical change in society and that these defects are only the result of more basic causes in the organisation of society that we desire to be more direct about. Although this had always been our intention, we tried to bring awareness through the programmes the people organised, like the co-operative and the *mahila samaj*. Now on the contrary, we are trying to make the study of society the basis of our training programmes and will try to build this study into all the existing programmes as well.

Even at this juncture, we are fully aware that unless the pattern of the entire organisation of society is changed through the political power structure, no amount of socio-political education at the micro level can hope to achieve anything substantial. It is only an extensive and well organised class struggle that can bring radical changes.

It is here that we are puzzled. When we discuss with our friends who attempt this change through the political power structure, they either tend to be vague about their strategy or have much to explain from the theoretical point of view but no practical experience from which we can benefit. On the other hand, policy measures for equitable distribution have been and will continue to be a failure in a country like ours.

We cannot sit back and wait for the revolution. It is only if individuals, groups of individuals and communities, begin to act as creative irritants in their ideas and act with conviction and determination that a basic change in the organisation of society is a possibility and a purpose worth living for. When such processes meet and coincide with prophetic leadership for change at the national level we will be prepared to pursue total change.

And Random Thoughts to Round Up

No amount of analysis, nor the most radical ideology will go a long way in practice, if a worker (community

worker) does not personally develop skills of relating to people and become accepted by them.

As a community worker, one has to constantly question one's approach and motivations if one is sincerely committed to the cause of liberation and justice.

The change process has to be continuous. What may seem liberating in its initial stages may be an obstacle later. Stability may be a danger signal.

The co-operative structure, in spite of being the chief way to ensure equitable distribution, when experimented in small pockets, can become a capitalistic institution in itself.

The area in which one chooses to begin the awareness building process cannot be a random choice. This choice must be guided by a proper analysis of the area and society. Good intentioned efforts to do something end up in frustration when this point is not considered.

A commitment to the transformation of society cannot be lived single-handed. The values envisaged for the "new society" should already be lived and experimented within small groups. Only this can provide the supportive structure to pursue the transformation and at the same time prove the operational feasibility of new forms.

SCIENTIFIC WORKERS' FORUM (WEST BENGAL)

Scientific Workers' Forum, West Bengal, made its humble beginning in 1974 and was formally constituted in May 1977. Today the Forum has about two hundred members coming from various educational, research and industrial establishments situated mainly in Calcutta. The objectives of the Forum have been, *inter alia*, "to work for the most effective use of science and technology and the scientific method for the interest and well being of the people of the country" as also "to expose and fight against abuse of science".

To achieve these objectives, the Forum finds it necessary to mobilise the opinions of all categories of scientific workers through regular series of seminars, symposia, etc. and through its magazine, "Vignan-O-Vignankarmi" (Science and Scientific Workers) which is a bilingual (Bengali and English) bimonthly to uphold and emphasise the social responsibility and obligation of the scientist. The topic on which the Forum organised seminars, etc. may be exemplified by the following: Science Education in Schools, Spying with Nuclear Devices and Nuclear Hazards, Science Movement in Kerala, etc. The Forum is also actively participating in the work of a "Preparatory Committee" composed of representatives of employees of non-statutory, autonomous research and other scientific institutes to launch a movement to eradicate the "master-servant" relationship prevailing in such organisations and to democratise their structures and activities.

The Forum considers that raising social consciousness of scientific workers is complementary to raising scientific consciousness of the people. A successful science movement cannot be launched only by scientific workers. The Forum has, therefore, recently formed a group to undertake the study of the activities of different voluntary science bodies, such as the "Bangiya Vignan Parishad", some hundred science clubs, hobby centres and the like so that a vigorous discussion can be generated on

how best science can serve the country, particularly the rural poor, and how scientific activities can be geared with people's expertise and enthusiasm. The group has undertaken necessary surveys, preliminary studies and discussions and is soon expected to come out with a concrete programme of activity. Meanwhile, reports of activities and progress of science movements in other States of the country, particularly of 'Kerala Sastra Sahitya Parishad' have been sources of inspiration for the Forum. Inter-state communication is vitally important for any such effort in any corner of the country.

SCIENCE EDUCATION GROUP (BOMBAY)

The Science Education Group was formed in the middle of 1976, with the aim of propagating a scientific attitude among the people. Initially, members were mainly drawn from among working scientists and students of science, but the composition of the group has changed gradually and at present it consists of individuals from several disciplines and professions.

To begin with, two main activities were initiated. Firstly, a weekly discussion meeting in which various subjects were taken up for self clarification within the group. The subjects discussed include science and superstition, Piaget's work on the development of intelligence in the young child, teaching of language to apes and the implications of these experiments, the Indian education system and the population question.

The second activity was slum education programme. The intention here was to popularise science among the poorest sections of the society. The aim was not so much to impart information in the compartments of Physics, Chemistry, Biology etc. as to encourage and inculcate a comprehensive scientific attitude to all aspects of the real world. How to achieve this was a matter that we had little experience of, and hence it was decided that the initial activity should be directed towards understanding both the difficulties involved and potential for such education.

To this end, it was necessary to establish a regular channel of contact with the people who lived in the slums. This was achieved through tuition programmes in the subjects of Mathematics and Physics for students in the 8th, 9th and 10th standards.

It was soon discovered that the problem was extremely intractable as most of the students had not grasped even the simple fundamentals of the subjects. Our attempts to provide these fundamentals in a short time before the annual examinations did not meet with much success. But the main purpose of establishing regular channels of contact was achieved. We formed close and friendly relations with our students, their

families and other youth in the slum. We were often invited to participate in the cultural and social activities of the residents. Numerous discussions were held on subjects ranging from caste to life on Mars.

Another aspect of our work was experimental demonstrations. Unfortunately, it was not possible to hold these regularly, mainly due to lack of materials for a sufficient number of experiments.

This activity was much more successful, at least in drawing a large audience and enthusiastic participation. The telescope demonstration was especially appreciated. We took a two-and-a half inch telescope and looked at several distant objects, demonstrating that hidden worlds appeared on far away signboards. We looked at the moon and observed the craters. A large number of people took part, women and children, young and old.

The fact that the moon was a distant object was established, and was followed by a demonstration showing the Earth-Moon-Sun system, how day and night occurs, and the secret of the phases of the Moon. Next, we prepared and showed slides of the moon seen through bigger telescopes, and finally slides of the men standing on the Moon. In discussing eclipses, we tried to gently refute the view that there were any thing other than entirely natural causes of the same.

However, it became clear to us that success in drawing crowds is quite distinct from propagating a scientific attitude, even when the subject matter of the programme is drawn from what is commonly known as "Science".

But we have arrived at a much better understanding of the obstacles, and the criteria for a successful method.

Any programme to propagate a scientific attitude must necessarily satisfy the following criteria. It must be interesting; otherwise, it will not reach a sufficiently broad section or maintain a continuous motivation. It must deal with the every-day life of the people or else the education will remain an isolated pocket in their consciousness, soon forgotten. The method must be such as can be implemented through the participation of local youth. We realised this when some of our students started taking classes for the young children of the slum which appear to be better attended than our own.

Keeping these criteria in mind, and especially the requirement of a mass medium we came to the conclusion that the

[organization & bulletin office]
326, V Main, Ist Block
Koramangala, Bangalore-560 034

audio-visual method must be used extensively. Ideally, films will be the best form of the audio-visual material. But the cost involved in making films were beyond our reach. We thought that slide shows are something which we could make quite cheaply and their effect is also comparable to that of the films. In order to explore the potentialities of this medium, we made our first slide show.

This slide show dealt with a problem which very vitally affected the lives of slum dwellers—the threat of slum eviction. The first purpose of this slide show was to make slum dwellers aware of an act called the Maharashtra Vacant Lands Act under which they can be evicted at any time without recourse to a court of law, of the fact that such evictions were taking place. We then raised the question of why such a law had been passed and tried to answer it scientifically by going to the very basis of the problem. How did slums arise in the first place? Who benefits from slum eviction? We did not give any ready-made solutions, but tried to create an awareness that for this problem to be tackled it must first be understood and further that slum dwellers must understand their own strength to organise and fight for their rights.

The slide show was conducted in some slums, but unfortunately, upto now we have not been able to do it very extensively as we had only one copy. On the basis of discussions held with the people, we have modified and continue to modify the show. Since this slide show directly calls slum dwellers to organize and fight for their rights, we found, it could be used most effectively in areas where there were already organizations of slum dwellers which could take up this issue. The slide show by itself can only focus attention on the problem—we found that we ourselves did not have the resources to take up the work of organising slum dwellers around this issue on a wide scale.

After analysing and discussing our experience with this first slide show, we have decided to make a series of slide shows, which will form the basis of a regular and comprehensive programme of education for both rural and slum audiences. The areas which we plan to cover are:

1. The Human Body 2. Social Health 3. Evolution 4. Nature and the Environment (The Physical World) 5. Astronomy and Origin of the Earth. 6. People of India 7. People

of the World 8. History of India 9. History of the World 10. Every Day Commodities and Economics.

Each of these areas will be covered in a series of 5 to 6 brief slide shows.

The programme may also involve a literacy component, depending on the audience.

The detailed formulation of the programme, the preparation of materials for it and its day-to-day running will be carried out with the active participation of educated unemployed youth from the slums.

In addition to slide shows, use will also be made of charts, maps, practical demostrations of the microscope, etc. Supplementary activities will include preparation of wall papers by the youth, and occasional theatrical and cultural programmes.

We are now preparing for this programmes by way of getting materials ready by discussing it with people in the slum. The first series of 6 short slide shows on Evolution is nearing completion. In this series of slide shows on Evolution we first introduce the concepts that are familiar to the audience and then move to less familiar and unfamiliar concepts. Thus, the first slide show starts with the articles used in daily life of an industrial worker in Bombay, and the change in these articles in the last three generation. Then we raise the question: What articles were used by our ancestors before a few hundred generations? Then we show the finding of the excavations at Nevasa, a village in Maharashtra. The next two slide shows make the audience familiar with the concept of fossils, the idea that fossils tell us the story of the past, that there were some living beings in the past which do not exist today, that those which exist today did not exist at certain time and there is a certain sequence in which animals came into existence. In the fourth show, we talk about the similarities and differences in the structures of various animals leading implicitly to the idea of classification of animals. The fifth show narrates the actual story of evolution and the final one explains the mechanism of evolution. We feel that the slide shows that we will be making and modifying over a period of time can also be of considerable use to others doing similar work and are interested in exploring the potential of the audio-visual medium.

Initially, we also had the plan of writing a few series of short articles covering broadly the areas described above. We

wrote about five articles based on the articles by J.B.S. Haldane, published in the *Daily Worker* in the thirties and forties. The articles that we wrote were meant for the youth in the slums who could read and write but who for some reason or the other, could not complete the formal education. We had the intention of publishing such articles regularly in some periodicals that reach this audience. But we found that there really do not exist any such periodicals in Marathi and we ourselves were not in a position to undertake and sustain the publication of such a periodical. We were therefore forced to abandon that plan for the time being and shift the emphasis primarily to the perparation of the slide shows.

Recently we participated in a debate on Science Policy initiated by *Science Today*. We also critically examined the position taken by Dr. Ramanna and Dr. Atmaram on Science Policy, in the present social context of India and exposed clearly the intellectual bankruptcy of the scientific leadership in India.

SHRAMIK SANGHATANA, DHULIA (MAHARASHTRA)

Shramik Sanghatana (Toiler's Organisation) is active in Dhulia District, Maharashtra, since the last six years. The river Tapi flows across the Dhulia and Shahada, Taloda, Akkalkurva and Nandurbar, the four talukas which form the fertile Tapi valley. Shramik Sanghatana has a strong base amongst the tribals, landless labourers and small farmers of these talukas.

Shramik Sanghatana is more a movement than an organisation. In 1972, six young men joined the late Shri Ambar Singh, a self-made indigenous leader of tribals who was working in Shahada. Together, they took the issue of the tribal lands which were alienated from tribals by non-tribal rich landowners by deceit and coercion. The group started mobilizing the tribals on this issue and within three months had been able to liberate more than three thousand acres of land from the clutches of rich land-owners. This land was taken in possession by the tribals by collective the efforts of both landless labourers and landowners themselves.

Starting from the land problem, the Sanghatana took deeper roots and expanded by taking in hand various issues. Through various issues, the Sanghatana established an intimate relationship with the population on various levels through various ways. Through the struggle on various issues, the new leadership emerging from landless labourers was trained and given opportunities to develop. Now there is a well co-ordinated group of full-time activists (more than 12) who keep in constant touch with the population of more than 300 villages.

Youth League, Labourer's Committee, Women's League and such village level organisations identify themselves with the Sanghatana, and handle the routine problems of the village. These organisations keep a live contact with their counterparts in the neighbouring villages, and give and take assistance of each other whenever needed.

There is no hierarchical structure in organisation. All the

full-time activists equally participate in decision making process. In fact, the very absence of the posts like President, Vice-president, Secretary, etc. negates the hierarchy. On the other hand, very conscious efforts are made to involve the newly emerging leadership in the decision making process.

The Sanghatana believes, that exploited and oppressed masses must become conscious of their relationship with the oppressors and react to this reality, collectively and positively. This raising up of the consciousness, and the organised struggle help not only in organising them under a single organisation, but also to free them from apathy, ignorance, superstitions and acceptance of the oppressing reality. It presumes the broadening and expanding of their consciousness beyond the boundaries of the village, exposing them to the achievements of the modern man in the various fields of knowledge. To be real human beings, the oppressed labourers must assert their right to live as human beings, and must become aware of themselves as human beings. The struggle, constant and ever intensifying must be waged to change the concrete reality of the oppressed. This is a long tortuous process that requires conscious mass action.

The rural poor are the prisoners of their own narrow consciousness, victims of traditions, superstitions, customs, and religious rituals. Blind to the total reality, and his place in it, he becomes not only a passive victim but an active perpetuator of the oppressive relationship. He must be liberated from the prison of this narrow consciousness. This consciousness must be broadened and expanded beyond the boundaries of the village. It necessitates exposing him to the achievements of human beings in various fields of knowledge.

It would be illogical and unreasonable to expect this prisoner of narrow consciousness to be class conscious in the real sense. As long as his consciousness is constricted to the village, all efforts to raise his class consciousness would turn out to be giving him dogmatic beliefs. All revolutionary class concepts would become *mantras* to be chanted.

The real agitational mass activity presupposes the emergence of local leadership, increasing awareness of the social problems, non-authoritarian, non-bureaucratic relationship in the organisation and interdependency of the leadership and masses.

Following are some of the issues the Sanghatana dealt with:

(1) The issue of the tribal lands, taken by the non-tribal rich landowners by various legal, semi-legal, illegal, coercive methods, often taking advantage of bureaucratic methods of working of state officials,
(2) Minimum wages for agricultural labourers and Saldars (yearly contract labourers) and implementation of minimum wage act,
(3) Distribution of cultivable fallow forest lands and village Panchayat lands to the landless labourers,
(4) Distribution of housing plots,
(5) Organised oppression and atrocities of the rich landowners,
(6) The attempt to establish a private para-military organisation under the name of crop protection societies by the rich landowner's to crush the landless labourers,
(7) Corrupt practices in courts, police department and forest department,
(8) Implementation of the Employment Guarantee Scheme,
(9) Short term loans provided to small landholders by nationalised banks,
(10) Recovery of the short period wages due to the labourers from the Building and Construction Department, demand for government enquiry into Dy. Engineers' corrupt practices,
(11) Wage demands of Bidi mazdoors in Taloda taluka, and
(12) Demand for Ashram schools for the children for each group of five villages.

The following are some of the activities of the Sanghatana:
(1) Education of the masses on various concrete issues along with the struggle for specific demands,
(2) Selection and training of the newly emerging leadership,
(3) Establishing Labourers' Committees in every village,
(4) Establishing Women's Committee,
(5) Establishing and guiding Youth Committee,
(6) Training and development of full time activists, and
(7) Establishing and guiding Bhajni Mandals.

Considering the period of only six years, the Sanghatana certainly seems to be following the right path. The Sanghatana

had embraced the masses on various levels, through various aspects of their life. In fact, the Sanghatana is in the process of becoming the toilers' movement.

Inhuman atrocities and oppression of the rich peasants have been certainly lessened. People have become more demanding and fearless vis-a-vis the police and bureaucracy.

Many young boys, emerged from the struggle are taking the responsibilities of the movement.

SOCIETY OF YOUNG SCIENTISTS (NEW DELHI)

(*All India Institute of Medical Science*)

The Society of Young Scientists came into formal existence in May 1974 as a body of like-minded people with certain definite intentions. The society comprises young research workers. Its formation *per se* may not be as significant as the fact that the society set before itself objectives which are a welcome deviation from the contemporary moods and trends of other student and youth organizations.

Today in our country so much is being talked about Science Planning, Appropriate Technolgy, National Objectives and so on. It was, thus, the time when we as young scientists, who have been reduced to a mere insignificant part of the whole community, paused for a moment to reflect on the general situation. What we presently observe are huge constructions, and sophisticated laboratories for the "experts", the most "qualified" scientists, who are carrying out the National Science Plans with very well stated objectives. Yet—in severe and naked contrast—we observe the majority of our people barely having the basic requisites to maintain their lives. Does it not become important to know why is this so? Should we not go into more details to understand why the fruits of our labour—the scientific activity—have failed to reach the common man? Does it mean that our existence and activity are totally irrelevant and redundant? We are out to find answers to these central questions. It is not just a matter of academic discussion and high flown words. Our very existence depends upon the answers. Let us ask ourselves whether we want to lead an opportunistic vegetative existence or give some meaning to our life. Accordingly, the aims and objectives of the society have been laid out. These objectives are:

1) To promote interaction between various categories of members by periodically arranging inter-disciplinary

seminars, guest lectures and group discussions;

2) To convey the scientific knowledge to the common man;
3) To improve the working conditions of medical scientists (teaching and research); and
4) To aid the needy and deserving scientists in the Institute.

The practical difficulties in any society, for that matter, would come in idealising certain things and looking at the reality and practicability. But then, one finds an alternative answer and that is on what approach to have? In order to attain these objectives and give them a wider outlook, the following course of action has already been adopted.

The mode of functioning of the group itself includes the decision making processes, the concepts of democratization, decentralization, increased involvement of people, creating an understanding for each other and tackling of situations through mutual discussions, thereby reaching at certain positive conclusions, mostly unanimous.

A platform of immediate common interest exists and functions in the form of interdisciplinary seminars, group discussions, lectures, etc. We know that scientists, because of their nature of job and training in elitist institutions, have become isolated from the people and social realities. If this continues to be like that, without even a hint of whether what is done has some content and some use, then the product necessarily will be below expectation. The analogy could be drawn with many workers working for, say, construction of a building without having the slightest idea of what the others are doing. The outcome or the product, of course, will be an utter disaster, which in real sense we are facing presently in the country. It is hence important to discuss amongst ourselves not only "scientific" matters but also science in relation to our society.

It was with these intentions that initially a platform of scientific lectures and discussions with a qualitatively different approach of integrating it at our own level was thought of. This approach had two positive results: (i) people got together quickly because of their interests to acquire knowledge, (ii) to break the interdepartmental rivalries, proving a lesson for conservative senior scientists and encourage the feeling of helping each other in scientific endeavours. A series

of group discussions have also been held on "Improvement of Medical Research" (the society being based in a medical institute involving scientists in medical sciences), on this platform. Besides, a number of lectures and group discussions have been organized on topics related to questions of relevant/non-relevant research, science and society and so on. On this platform we have come to the conclusion that identification of the problems of the common man (in remote rural areas in the country) by an interdisciplinary approach where it is envisaged that teams comprising workers from Agriculture, Veterinary Science, Technology, Medicine, Basic Sciences and Social Sciences shall make serious studies of their problems in villages, in order to find ways to solve them.

The society is to work for improving the conditions of the young scientists, in order to better science and build better academic environment suitable to the Indian ethos. The society intends to resolve petty constraints of bureaucracy and create conditions where the best potential of the young scientists can surface (which is not happening presently). We want to fight against the exploitation of young research workers. The exploitation is at several levels:

i) Not allowing young scientists to undertake projects in the areas of social effectiveness because these are often not recognised by senior people as projects with good potential for good academic standard of research, an abstract, rigid notion which they continue to follow. They may, however, allow a lot of repetitive, routine research which can fetch them publications in "international" journals,

ii) Most of the actual research is being done by the younger scientists while the senior scientists (who are mostly busy making national and international contacts) tend to take primary credit for all that is done. This leads to a hierarchy in research institutions which does not allow young scientists to grow and express their potentials.

iii) Employing young and upcoming research fellows at much lower fellowship than employing technicians who may be comparatively less productive, both qualitatively and quantitatively, and

iv) Discrimination of various nature of medical scientists e.g., non-essential, culminating in various socio-economic

differences and thus inhibiting the young scientists.

Several of these contradictions and poor exposure to social realities, because of the very infrastructure of the system, are the main reasons for the majority of scientific research being non-productive, insofar as the common man is concerned.

In short by all these interactions we have come to believe that the research is not an activity merely confined to the laboratory, but is an activity depending on and profoundly affecting the socio-economic and political realities of any society.

The achievements of our society at the moment may seem rather meagre in the short span of its existence. Nevertheless, the efforts put in by all our members despite the constraints faced by them are in themselves an encouragement to us and we hope to fulfil the uphill task that we have undertaken. We feel that we cannot insulate ourselves from socio-economic-political realities and now we are in a phase in which we have to look forward to the growth and development of the society for the masses of the country.

Let us face the reality of the value system in which we are brought up and the type of education we undergo, the myopic vision of conservatism and unhealthy and unscientific traditions, which never let us widen our vision and bring originality to the surface. With all these contradictions of interests in such elites, how difficult it is to change oneself towards accepting the hard fact that we have not been able to do anything concrete for the downtrodden.

THE SOKHODEORA COMMUNITY HEALTH PROGRAMME

The Ashram and its Health Programme

The Gram Nirman Mandal was founded by Shri Jayaprakash Narayan in 1954 with its head office at Sarvodaya Ashram, Sokhodeora. It is situated at a distance of 70 miles from Gaya town and nearly 30 miles from the district head quarters at Nawadah. This institution, since its inception, has been engaged in social and economic development of the rural area around the Ashram.

Health service is one of the basic needs of the area. People suffer mostly from malnutrition. Reccurrence of a number of diseases such as malaria, anaemia, gastro-intestinal diseases and leprosy are mainly due to ecological reasons. The Ashram has been making efforts to provide preventive and curative medical care to the best of its resources. A child and maternity centre was started in 1956, but it had to be closed down in 1965 because of paucity of funds. Again, after making arrangements for funds from some donor agency, it was converted into a Primary Treatment Centre in 1972 which at a later stage became the main centre for health extension education.

The area around the Ashram is predominantly a leprosy stricken one. A leprosy treatment hospital was founded in 1954 at Kapasia village. At the moment this centre provides services to about two lakh population in three blocks—Kawakole, Pakaribarawan and Warsaligant of Nawadah district. The field area extends even to Aurangabad district where a similar leprosy centre has been established. The hospital provides both outdoor and indoor services to the patients. An important activity of the centre is the rehabilitation programme which helps the neglected leprosy patients to start social life with new hope. Recently a functional literacy programme for women has also been started. Both leprosy patients and girls from villages learn tailoring in the same class room with adequate health precautions.

From May 1973 to April 1976 a project on "People's Action for Health and Family Welfare" was conducted. The project aimed at raising a corpus of trained voluntary workers and 'dais', a multi-pathic approach for health education, services and family planning and successful application of a local herb, "banjhauri", as a permanent method of family planning.

The project achieved significant results in its aims. At the beginning of the project 75 percent of the population stated: "one can have healthy children and can also lead economically better life only if he observes small family norms". The training of local dais contributed much towards this objective. Some twenty dais were trained. They helped to reduce the problem of ante-natal and post-natal care to a great extent. The multi-pathic approach ,i. e., using Ayurveda, Homoeopathy, Naturopathy, Unani, Yoga and local traditional practices also helped to improve general health complaints. The vaccine, inoculation and immunization programmes minimised the prevalence and incidence of epidemics like cholera, smallpox and malaria. Finally the discovery and testing of the indigenous herb "banjhauri" used in bringing about permanent sterility in women was an important achievement of this approach.

The Present Community Health Programme

On the basis of previous experience a new programme was drawn up and has begun operating since July 1978, with assistance from OXFAM.

The programme has a three-year span and aims to cater to a population of 25,000 people spread over 40 villages and hamlets in the Kowakole block. The project aims at reducing the morbidity and mortality rate in this area and create better health standards especially among the children under five years.

To achieve this aim, the project has the following programmes:

1. Survey and planning for action,
2. Formation of village health committees in each village, selection and training of male village health workers and female dais,
3. Health education,
4. Immunisation and environmental sanitation, which include purification of drinking water, *Sulabh Shauchalay*, etc., and

5. Establishing two health sub-centres for treatment of patients.

Achievements

In the last four months a basis has been laid to run the above programmes concurrently.

1. *Survey and Planning.* The core staff i. e., one Medical Officer, one ANM and one Medical Social Worker have been recruited. A plan for surveying ten percent of the households in the study area has been finalised. The household schedule has been developed that includes information about family composition, morbidity, mortality, natality and MCH. An inventory of the common diseases prevalent in the area has been made for combating them immediately which has helped in deciding priorities in training the VHWs.

2. *Health Committee.* In each village a health committee has been constituted. This took a long time because it required a lot of patience to persuade contending local power groups to come together for a common cause. Each village health committee subsequently selected a village health worker on the basis of his past experience in health work and interest in serving the community in a voluntary spirit.

We interviewed 22 male VHWs and found that they were mostly young men in the age group of 20 to 25 years though one or two were around 30. Education-wise all of them were above class 8, a good number of them having failed in matriculation examination. A few were graduates. None of them had any formal training in health work, but nearly half of them have had some previous experience in health work using Ayurvedic, Homoeopathic and Allopathic traditions. This experience ranged from having helped the patients to reach the doctor, worked as doctor's assistants or having an established clinic of their own for past few years. Most of them have shown good knowledge of the prevalent diseases in their area—their symptoms, cure and prevention. On being asked about their motivation, the answers ranged from willingness to serve the community to increasing their existing knowledge to serve the community better.

Evaluating these interviews with the project staff, a scheme has been drawn to know the background and knowledge and attitude of the VHWs better so that the training scheme can be drawn according to the needs of the situation.

3. *Health education.* However, the project team has gone ahead with preparing lecture courses in Hindi on the most prevalent diseases like leprosy, cholera, malaria and smallpox. They have also procured a lot of health education literature and posters from Voluntary Health Association of India, Delhi. They have held poster exhibitions and done some propaganda. In our discussion with the project team the long term goal of the project as "Informed Self Care" was emphasised and it was recognised that every health activity such as VHW treating a patient or VHW referring the patient to the project doctor *must* involve education. That is, in an interaction between the villager and VHW, the villager goes better informed about health and is able to take care of himself better. Similarly in any referred interaction between the VHW and the doctor, the VHW is better educated and the community is better equiped to look after itself.

4. The immunization programme aims to immunize every child against smallpox, TB, DPT and Polio. The team of course is ready to meet the challenge of any epidemic immediately outside its schedule. For example, the inaugural session was considerably disturbed because the project team had to fight cholera in some areas. As far as environmental sanitation is concerned, it is the village health committees that are expected to take the initiative. The project is ready to grant 25 percent of the expenses on building hygienic latrines.

5. The project envisages two health centres serving over 12,000 population each. These health centres are meant for direct treatment, referred service for the VHWs and in clinic training of the VHWs. Every day one male and one female VAW is expected to attend these clinics so that all of them are exposed to the treatment of a wide variety of diseases in the OPD. One of the centres is the old primary Treatment Centre at the Ashram which is operating well, catering to 60 to 100 cases a day. Besides the doctor, it has a ANM, a compounder and a trained dai. There is good facility for pathology and simple surgery like hydrocele. The centre also has MCH facilities. Over the years this centre has become more popular with the villagers than the goverment hospital because of the voluntary nature of the institution and the education of the workers.

Problems and Prospects

Community. Too often health projects have failed because they failed to gain confidence of the community, arouse its interest in the project and achieve its involvement in the project. The present project however has the advantage of being part of a prestigious Ashram which is in the area for the last 25 years. However, this poses the problem that the community's attitude towards it already has a bias which will necessitate an imaginative and self critical approach on the part of the project. In particular there is the problem of asking the community to pay for health service where in the past Ashram provided free service. Secondly the health committee and the VHWs in some cases may represent local power interests that do not have a popular base. In such cases immunization and environmental sanitation programme will either succeed with favoured groups or will be looked upon with suspicion.

The Village Health Committee. This appears to be the most important organisation in the infrastructure and is therefore also riddled with very complex problems. It is supposed to maintain a revolving fund to replace the medicine, to pay for the services of VHWs, to build environmental sanitation and host health education camps. Its two sources of income are the project and the community itself. Though the project has assured some seed money, it will be very inadequate and will be depleted soon in meeting these tasks. On the other hand the community, considering its poverty, may not be in a position or be motivated to pay adequately. Finally, inasmuch as there are diverse and conflicting interests in the community, it is difficult for it to sustain and gain the confidence of the entire community. The success of the programme can be assured only if it is visibly demonstrated that every one in the community has something to gain even if everyone does not gain equally.

The Village Health Worker. He is potentially the most important person in the scheme, because he stands to gain both in knowledge and in prestige in the community and he may also materially improve his position. However he too faces several problems. To begin with, he may be too poor and the remuneration he gets in health work is too meagre to allow him to give enough time. This will also colour his motivation. Those who

have already an established practice will definitely gain in knowledge and prestige but may not contribute much towards health education and preventive measures for the community. If the training does not take into account the differential base level of the VHWs, it is likely that some will become good doctors and some may dorp out. The dais being women are not likely to travel distances to get trained when there is no material incentive. The ANM will be required to give them on the spot training while attending cases with them. If her mobility increases with the help of a bicycle, she will not only be able to work better, but also appear exemplary in a backward region.

Given this wide variation in the VHWs it was suggested to introduce a horizontal structure too, that is, a group of 4-5 VHWs work as a team to even out their different levels, learn in a collective fashion and self learning promoted. In this connection it was suggested to encourage setting up of a local library with good and simple books on medicine and health.

The Project Team. The project team has the dual role of being the initiator of the project taking leadership and of working in such a manner that they become dispensable at the end of the project with the community learning to take care of itself. This poses a variety of complex problems in its relation with VHWs, health committees and the community. For example, it has the task of helping the VHWs to learn, but not controlling them. It has to assure supplies to the health committees in the face of uncertain government and market supplies—particularly in the case of vaccines. Finally it has the most important and difficult task of conveying its modern democratic concepts to people who come from hierarchical village communities. In this regard the context evaluation of the programme from time to time will help the project team to detect its weakness and to improve its functioning.

Conclusion

The programme faces a challenging task. It has certainly the potentiality of achieving significant success if it can successfully identify the local problems and situations and learn from similar experience in other places.

AN INTRODUCTION TO "VIKSHAN" (CALCUTTA)

Calcutta 1972. We felt that so many of us youths who were radical and concerned about people, ourselves had little scientific attitude. So we thought of bringing out a popular, non-party science journal in Bengail which would take the problems people face in daily life and analyse them concretely. By this we hoped that we and our young friends will be motivated to develop a scientific attitude among ourselves and learn to relate with people on a concrete scientific basis of sharing problems.

However, the situation among youths was that they were not very receptive to these concepts and demanded a wider approach. The modification of the original idea behind *Vikshan* in the context of radical student movement of the 70s and its theoretical critique did however give a specific orientation to the question of popularisation of science. *Vikshan* thus developed a critique on the following issues and tried to suggest a positive approach.

1) The attitude to the so called "natural" disasters like flood and famine was to treat them as inevitable and rush to relief work. *Vikshan*, on a special issue on famine in early 1975 developed a socio-economic and political critique of the phenomena.

2) Youths tended to divide themselves dogmatically on socio-economic questions behind the so-called party lines and did not try to appreciate the fact that to be effective these have to have a living scientific development. *Vikshan's* critique resulted in a book in Bengali, *An Introduction to the Political Economy of India.*

3) The critique to science education tended to brand it reactionary or colonial and reject it instead of looking into the dynamics and the real experience of the teacher and the taught.

4) The attitude towards achievements in science in India tended to neglet it totally, instead of loooking for the history of real efforts made by our scientists and developing a concrete critique.

5) We tried to bring into focus the democratic and progressive activities of science workers like James Sapiro, Reddy, Haldane, etc. On the other hand, we brought into debate the questionable attitude towards public cause of such reputed scientists as Gellmann, Wigner, Wheerer, Drell, ete.

6) We tried to arrange seminars and study circles on the causes of "natural" disasters, history of science education, popularisation of science, etc.

A SELECT BIBLIOGRAPHY OF ARTICLES PUBLISHED IN "VIKSHAN" 1974-73

Group I "Natural" Disaster

1. Hunger, Famine, Imperialism—a World Survey
2. Myth of Overpopulation
3. Famines in India
4. How Famine is Conquered—Israel

(Special Issue on Famine '75)

Group II Political Economy

1. An Introduction to Political Economy of India, (Serialised from 1974 to 1975—Now published as a book).

Group III Science Education

1. Science Education in Undergraduate Colleges (1974)
2. Science Text Books—How Irresponsibly They are Written (1978)
3. Man and His Environment—A New Approach to the Study of Geography (1978)
4. Epar se Move—Galileo—Sociological Background of His Works (1974)
5. Copernicus and His World Model (1975)
6. The Birth of Science (1974)
7. History Textbook Controversy—(in four issues, 1977-78)
8. How a Fool Discovers the World—An Attitude to Philosophy.
9. Philosophy Without Fears

Group IV Indian Science and Scientists

1. Professor Satyen Bose
2. Science for Development or Underdevelopment (1974)

3. Was This Sacrifice Necessary?—Reddy (1974)
4. Science Research in India—Saha Institute of Nuclear Physics, Calcutta (1974)
5. Science Research in India—Tata Institute of Fundamental Research, Bombay (1975)

Group V The Role of Scientists in Society

(a) *Progressives*

1. Michurin (1974)
2. Haldane (1974)
3. James Sapiro (1974)
4. Louigi Gorini (1978)

(b) *Anti-people role of scientists*

1. The War Physicists—Jason

Group VI Field Reports

1. Experiences of a Literacy Campaign (1977)
2. Experiences of Famine Relief (1975)
3. A Village Survey (1978)

VIGYAN SHIKSHA KENDRA (ATARRA, UP)

An Introduction

The Vigyan Shikha Kendra (Science Education Centre) is a registered voluntary organisation set up in 1973 by a group of young scientists wanting to undertake an experiment in intergrated rural development through education and the popular application of science and technology. The group felt that it was important to work with the direct participation of the village community, interacting with scientists, technologists, educationists, and social workers. The work was taken up in the district of one of the group members with the help of the local educated youth.

The Vigyan Shiksha Kendra (VSK) is located in Banda, a south-eastern district of Uttar Pradesh in the backward Bundelkhand region. VSK maintains an office in Atarra, a centrally located town of the district. The development work has been taken up in two village clusters, the village centres being at Aau (5 km north of Atarra) and Terahi-Maufi(25 km north-east of Banda), together serving a total of 15 village units.

The objectives of VSK are as follows:

(1) to popularise science in rural areas and to develop science education in general to make it more relevant to village life;

(2) to impart industrial training to the rural youth, and to help them in setting up their own industries suited to local resources and needs, eventually enabling them to become self reliant; and

(3) to organise extension service in education, health and agriculture to aid the social and economic uplift of the community.

The Problem

VSK worked for three years on various projects designed to meet the felt needs of the area. During this time many problems arose which were dealt with individually. It was felt that

it was important to undertake a comprehensive survey of the area, so that a clearer picture of the problems and potentials could be obtained, thus allowing a comprehensive strategy for development to be formulated.

The survey was carried out during 1976-77 in the 15 villages of the two village clusters surrounding Aau and Terahi-Maufi. It revealed some of the root causes of poverty, which is the major problem of the lower and middle strata of the rural population. These causes appear to be:

(1) The majority of the population consists of the landless, and the small and marginal farmers. The means of production as well as a disproportionately large share of the village land is in the hands of a few farmers, and the landless have to depend on them for their livelihood;

(2) Agriculture is the only source of production and occupation, and there is a lack of other sizeable source of employment for the villagers; and

(3) There is exploitation (both conscious and unconscious) of the majority of the village community by a few, inside and outside the village through:
   a) money lending at very high rate of interest;
   b) low wages to the labourers;
   c) low prices for the agricultural produce;
   d) complicated judicial procedure, causing delay in justice, and that too at high cost;
   e) delay and injustice in land reforms and land re-allocations; and finally
   f) control of the marketing and processing centres by non-producers, particularly from the upper strata of the society.

The survey also revealed very clearly that so far, development inputs like the facilities created at the Community Development Block level or the credit given by the nationalised banks have almost totally been consumed by the rich and influential farmers, the middle men of the Government and the various private agencies. The poor have continued to become poorer.

It is clear that land is the most important factor contributing to power in the villages. The situation is that even if land reform and re-allocation measures were effectively implemented,

there is hardly any chance for all the landless families to secure an economically viable piece of land individually. Thus, though there is a need for land reform it is essential to work for structural changes in the society to allow for the co-operative management of the land. The basic problems of the landless peasantry have to be solved, the conditions of the agricultural labourers need to be improved, and alternative sources of employment have to be created for the underemployed and unemployed. For this, the problem groups, i. e., the landless and the marginal farmers, have to be strengthened on an organisational level to struggle for an improvement in their socio-economic situation and play a decisive role on the socio-political front.

Strategy for Development

Before the survey was carried out the strategy for development of the area was less clearly defined, and the projects taken up in the two village clusters were as follows:

(1) *Secondary school.* This was started to develop and transform the science curriculum and the teaching process in general. Prior to it, this had been carried out in various separate schools in Banda district. It was decided that this was expensive in time and resources. So a school was set up in the Aau centre. It admits post primary students from six villages around Aau for their secondary education. The discovery approach (learning by doing) has been introduced, and the students are given a vocationally oriented training, inclucating in them a sense of discipline, love towards their society and respect for labour. The school has served as an important link between VSK and the village communities, and it is being developed as a High School which is to be handed over to the people of the area soon.

(2) *Agro-industrial training.* This project was aimed to train village youth in agriculture, dairying and various village industries suited to the locality. A number of seasonal training camps have been held in previous years for the benefit of the farmers of the associated villages. The programmes under this project are:

a) *Ashmosh cement pilot plant.* A small scale industrial pilot plant was set up in Aau in 1976 to manufacture cement from the ash of the rice husk, and other readily available materials such as lime (it is called Ashmosh cement) by a process developed by Prof. P. C. Kapur of the Indian Institute of Technology (IIT), Kapur. This programme is being carried out in close collaboration with the IIT. Ashmosh is an all purpose cement, and has great potential as a rural industry, providing a valuable material for cheap housing, manufacture of well-rings, irrigation channels and bricks, etc. Together, these are bound to generate extra-employment potential for the village youth.

b) *Demonstration farming and bio-gas plant.* Several demonstration plots at Terahi-Maufi and Aau were managèd by VSK for the farmers of the respective area; this has helped us in successfully transmitting the importance of high yielding variety seeds, proper irrigation and optimum use of fertilizers, etc. A 150 cft bio-gas plant set up at our Aau centre has attracted hundreds of local farmers and their families. Thy are now in a position to accept bio-gas as an alternative domestic fuel.

(3) *Mahila sadan project.* This was started mainly to train village women and girls in tailoring, knitting and simple toy-making. At the same time, subjects such as child care, nutrition, health and hygiene, etc. are taken up, especially with the adult women who participate in the project.

(4) *Socio-economic survey of the 15 villages*: As outlined above this survey was carried out in the 15 village units of the two village culsters surrounding Aau and Terahi-Maufi. This was done by interviewing over 80% of the total households of the area in a number of visits throughout the year, meeting and discussing the village situation with village people and the local youth.

Since the completion of the survey these has been a change in the working of VSK. The group, which started with an institutional approach to education as well as village-development through the provision of necessary services and general

reforms, etc., has now changed its concept of rural development to one where youth organisations work as catalytic groups, thus enabling rural development through the people's own efforts rather than through externally acting forces. This conceptual change has occurred due to closer contact with the local communities through field work, education and the survey on the one hand, and contact with other action groups, development workers and agencies on the other.

Thus from 1977 onwards VSK had devised its strategy for development on flexible lines, and has concentrated its efforts into the following programmes:

(A) Agro-industrial training to the youth of the communities of landless and small farmers enabling them to become self-dependent and capable of organising their community around a necessary service or village industry.

(B) Development of local action groups of village youth to extend to the people services relating to: (i) agriculture, (ii) marketing, (iii) health, and (iv) education, and to strengthen the "receiving mechanism" for using the facilities provided by the local government agencies and the banks.

(C) A non-formal education programme to: (a) introduce adults to improved techniques and methods of their occupation and to inspire them to partake in co-operative action, and (b) educate out-of-school village children generally, and their mothers in simple health, hygiene and nutrition matters. This programme has already been started for the children of Aau village.

(D) Encouraging scientists and technologists, the educated youth from nearby colleges and universities and the government authorities to become involved in the process of development, and

(E) Development and transfer of suitable technology to the villages.

Towards the end of 1977, a handloom training and production unit was started in the Terahi-Maufi centre. This unit is training the poor and landless youth of Terahi-Maufi and its surrounding villages with an experienced trainer (a member of the VSK staff) and is producing both cotton and terecotton

fabrics. The handloom industry, not being capital intensive has enormous potential in the villages with which VSK is associated, provided it can gain independence from the large cotton mills for the yearn, etc., it requires.

A training course on Ashmosh Technology was held in March 1978 with the co-operation of IIT, Kanpur and Allahadad Polytechnic. It was paricipated by 15 entrepreneurs from all over the country.

Resources Available to the Vigyan Shiksha Kendra

Human: (1) The core group of VSK consists of the educated and uneducated youth committed to its objectives and approach to work; a few of these are full time staff of VSK.

(2) The support group consists of scientists and educationists from the universities and IITs and other socially conscious individuals and group. The support group helps VSK in planning its programmes and meeting its requirements.

(3) The work in the villages is through the educated and uneducated youth belonging to the problem groups, i.e., the landless and the small marginal farmers. These are termed the local action groups.

Financial: The VSK has so far been functioning on the finances generated through active memberships, donations, assistance from the IIT, Kanpur, loans and project grants from NCERT and OXFAM. However, a great attempt has been made towards making VSK self-supporting through small industries like the ashmosh cement and the handloom units, and through agricultural production and charges for essential services provided. We need capital assistance in the form of certain project grants or donations for a limited period during which we will work towards our financial self-sufficiency.

LIST OF PARTICIPANTS OF THE PSM CONVENTION, FEBRUARY 10-12, 1983

KARNATAKA

M.A. Sethu Rao
Hon. Secretary
Karnataka Rajya
Vijnana Parishat
C/o Indian Institute of
Science
Bangalore 560 012

J.V. Lakshmana Rao
Vice President
Karnataka Rajya
Vijnana Parishat
'Maitri'
12th Main Road
Saraswathipuram
Mysore 570 009

Sateesh
Karnataka Rajya
Vijnana Parishat
St. Ann's High School
M.R. Mohalla
Mysore 570 009

S. Somasekhar
Karnataka Rajya
Vijnana Parishat
Vijayanagar College
Hospet, Bellary Dist
Karnataka 581 201

M.G. Narasimhan
Science Circle
Lecturer, Jr. College
Solur
Karnataka

Rajendran
Science Circle
Indian Institute of
Science
Bangalore 560 012

S. Chatterjee
Science Circle
Indian Institute of
Science
Bangalore 560 012

Dhanaji Gurav
Self-Reliant Alternatives
to Western Medicines
Project
1877, Joshi Galli
Nipani, Karnataka
591 237

M.G. Venkatesh
Samudaya
46 Shop Street
Basavanagudi
Bangalore 560 004

Humayun
Samudaya
46 Shop Street
Basavanagudi
Bangalore 560 004

TAMIL NADU

T.D. Sreenivas
Patriotic People's Science
and Technology
17 South Mada Street
Triplicane
Madras 600 005

C.N. Krishnan
Patriotic People's Science and Technology
17 South Mada Street
Triplicane
Madras 600 005

A.V. Balasubramonyam
Patriotic People's Science and Technology
17 South Mada Street
Triplicane
Madras 600 005

T. Rajalekshmy
Patriotic People's Science and Technology
17 South Mada Street
Triplicane
Madras 600 005

MAHARASHTRA

Anand Phadke
Medico Friends Circle and Lok Vidnyan Sanghatana
50 LIC Quarters
University Road
Pune 411 016

Padma Prakash
Blossom Society
60 A Pali Road
Bandra
Bombay 400 050

Sagar Dhara
2/32 Om Trimurthi
Chunabhatti
Bombay 400 022

Arun Deshpande
Lok Vidnyan Sanghatana
162/11 Railway Lines
Katkar Blocks
Sholapur 413 001

Ashok Tuhl
Lok Vidyyan Sanghatana
Deep Nagar
Maharashtra 425 307

Ramesh Sudhanarayan
Lok Vidnyan Sanghatana
Deep Nagar
Maharashtra 425 307

Hemant Gole
Lok Vidnyan Sanghatana
Sholapur 413 001

S. N. Gutikar
Lok Vidnyan Sanghatana
1259/2, Jangali Maharaj Road
Pune 411 005

Chitra Bedekar
Lok Vidnyan Sanghatana
1259/2, J. M. Road
Pune 411 004

Vikas Chaitanya
Lok Vidnyan Sanghatana
1259/2 J. M. Road
Pune 411 004

Partha Sarkar
Audyogic Jeevan Manch
13/1, Armament Est
Pashan
Pune 411 021

Datta Savale
People's Institute for Development and Training
"Parvati" Sahayog Cooperative Housing Society
Near Manisha Nagar
Pandharpur
Maharashtra 413 304

Joga Madhavi
Jagruth Adivasi
Sanghatana
Nagepalli
Maharashtra

WEST BENGAL

M. N. Majumdar
Scientific Workers'
Forum
C/o Department of
Chemistry
Kalyani University
Kalyani,
West Bengal 741 235

Jyotirmoy Chatterjee
Convener
People's Scicnce
Coordination Centre
Subhaspally (Kalitala)
P.O. & Dist. Burdwan
West Bengal

Sri. Sriranjan Haldar
Manan Nava Chinta
Andolau & Bharatiya
Samyabadi Sangha,
A-17 P&T Quarters
264 Jessore Road
Culcutta 700 028.

Dipak Dan
Gobardana Renaissance
Institute & Eastern India
Science Club Association
P. O Khantura
24 Parganas
West Bengal 743 273

Mini Dasgupta
Gobardana Renaissance
Institute and EISCA
Khantura
24 Parganas
West Bengal 743 273

Sankar Chakrabarty
Eastern India Science
Club Association
289/C Bapuji Nagar
Culcutta 700 092

Deba Sishpal
Eastern India Science
Club Association
13 Regent Estate
Calcutta 700 092

S. Majumdar
Eastern India Science
Club Association
13 Regent Estate,
Calcutta 700 092

Samit Ghosh
Eastern India Science
Club Association
13 Regent House
Culcutta 700 092

Gautam Pal
Ashish Aich
Eastern India Science
Club Association
13 Regent Estate
Calcutta 700 092

Sukumar Roy
Vignan Durbar
24 Parganas
West Bengal

NEW DELHI

Harshvardhan Kapur
Kalpavriksh
A–8 South Extension
New Delhi

Mahesh Rangarajan
Kalpavriksh
91 Kaka Nagar
New Delhi 110 003

Dinesh Mohan
Centre for Biomedical Engineering
IIT
New Delhi 110 016

S. Dasgupta
Director,
People's Inst. for Development and Training (PIDT)
2 Kawshalya Park
Hauskhas
New Delhi 110 016

A. K. Bhattacharjee
PIDT
2 Kaushalya Park
Hauskhas,
New Delhi 110 016

RAJASTHAN

Narendra Gupta
Prayas
Village Devgarh(Deolia)
Via Partabagarh
Chittorgard District
Rajasthan 312 605

UTTAR PRADESH

Bhartendu Prakash
Vigyan Shiksha Kendra
Atara (Banda)
Uttar Pradesh 210 201

Girish Tewari
Uttarkhand Sangarsh Vahini
Chetna Press
Almora, Uttar Pradesh

Nirmal Joshi
Uttarkhand Sangarsh Vahini
Prateek Printing Press
Bhowali
Nainital
Uttar Pradesh

Shekhar Parthak
Uttarakhand Sangarsh Vahini
Almora
Uttar Pradesh

GOVERNMENT

U. Trivedi
Principal Scientific Officer
Department of Science and Technology
New Delhi 110 016

Rajendra Badonia
Sr. Scientific Officer
National Council for Science and Technology Communication
Dept. of Science and Technology
Technology Bhavan
New Mehrauli Road
New Delhi 110 016

Parwaiz Alam
Technical Assistant
National Council for Science and Technology Communication
Dept. of Science and Technology
Technology Bhavan
New Delhi 110 016

MADHYA PRADESH

Anwar Jaffri
Ekalavya
Hoshangabad Dist
M. P.

Goutam Bhattacharya
Ekalavya
Hoshangnbad Dist.
M. P.

Sushil Joshi
Kishore Bharati
Hoshangabad Dist
M. P.

KERALA

S. Sarma
Society for the Conservation of Nature
'Varada'
Trivandrun 695 001

Sebastian Mathew
Society for the Conservation of Nature
'Varada'
Trivandrum 695 001

Nalini Nayak
Programme for Community Organisation
Spencer Junction
Trivandrum 695 001

V. O. Kurien
Programme for Community Organisation
Spencer Junction
Trivandrum 695 001

OVERSEAS OBSERVERS

P. Mariflor
Department of Sociology
University of Philippines
Quezon City
Philippines

John Kurien
DAGA
57 Peking Road
Kowloon
Hongkong

George Ninan
CCA-URM Mission
57 Peking Road
Kowloon
Hongkong

KSSP ACTIVISTS

M. P. Parameswaran
Chintha
Mettukkada
Trivandrum 695 014

K. V. Reghunathan
'Sarag'
Cannanore 4

V. K. Damodaran
Electrical Engineering Department
R. E. C.
P. O. Calicut 673 601

K. T. Vijayamadhavan
Zoology Department
Devagiri College
Calicut 8

K. Sreedharan
28/204–B 'Pulari'
Chevayoor P. O. 673 017

A. P. Chandran
Kerala Sastra Sahitya Parishat
Vazhayoor P. O.
Ramanattukara 673 633

C. J. Siva Sankaran
Manjusha
Iringalakuda 680 121

M. K. Prasad
62 Girinagar
Cochin 20

Chunakkara Janardhanan Nair
Kerala Sastra Sahitya Parishat
Chunakkara P. O.
Alleppey

V. K. Sasidharan
Sathimandiram
Kannimelcheri
Kilikollur
Quilon–4

B. Iqbal
Neurology Department
Medical College
Trivandrum 11

D. Surendranath
Devi Clinic
P. O. Padiyattuchal
Payannor
Cannanore

C. N. Parameswaran
P. O. Kavalapara
Shornur
Palghat

P. Vijayan
Microbiology Department
Medical College
Calicut–8

M. S. Peethambaran
Edavanakkad P. O.
N. Paroor
Eranakulam

K. Sughathan
A–7, Medical College Quarters
Calicut 673 008

C. R. Agninesh
Ayurveda College
Kottakkal
Malapuram

Pushpitha John
Vikramapuram Kunnu
Trivandrum 3

Kottiyam Rajendran
Nellikkavila
P. O. Kottiyam
Quilon

K. M. Karunakaran
Karonnan Veedu
P. O. Kuttiattoor
Cannanore

Pathiyoor Gopinath
Rice Research Centre
Agricultural University
Kayamkulam

C. G. Santhakumar
Kerala Sastra Sahitya Parishat
P. O. Anthikkad 680 641

Thomas Varghese
Kochupuzhayidathu House
Chengannur

V. K. Bhaskaran
5/57 Chittoor
Palghat 678 101

A. M. Balakrishnan
Areemeethal, Memunda
Badagara

P. T. Bhaskara Panicker
Geethanjali
Vanchiyoor, Trivandrum

K. P. Kannan
Centre for Development Studies
Ulloor
Trivandrum 695 011

ORGANISING COMMITTEE MEMBERS

K. N. Raj (Chairman)
M. P. Parameswaran
M. K. Prasad
B. Iqbal
R. Radhakrishnan
V. Sreekumar
C. G. Santhakumar
K. K. Krishnakumar
K. P. Kannan (Convener)

medico friend circle
[organization & bulletin office]
326, V Main, Ist Block
Koramangala, Bangalore-560 034

The impetus and inspiration for science-based social activism came not from a mere desire for dissemination of information on natural sciences but largely from the disillusionment of concerned intellectuals.....

A collection of selected papers and reports presented at the conventions of People's Science Movements.